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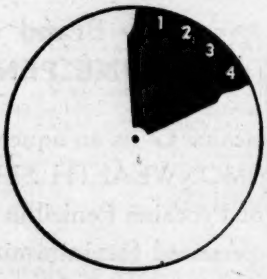

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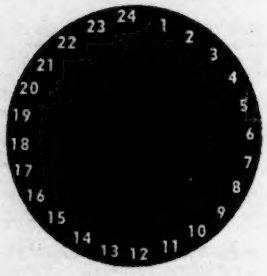

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CHANGES IN INFECTIVITY OF INFECTIOUS DISEASES.[1]

By H. McLORINAN,

Medical Superintendent, Fairfield Hospital, Melbourne.

THE title of my address may be misleading. I do not intend to confine my remarks to any one particular aspect of infectious disease, but rather to survey the subject broadly and to analyse the changes which have occurred in this branch of medicine during the last decade.

It is well known that all over the world fever hospitals have either extended their functions to include general beds or have been partially converted into general hospitals. This extraordinary and unexpected change has caused extravagant statements to be made that infectious diseases have now almost disappeared and are now no longer a social problem in the community. Tonight I should like to make a dispassionate survey of the present position as I see it in Victoria.

While tremendous strides have been made in the fight against disease, it is my considered opinion that the position in regard to acute infections, both bacterial and viral, is not altogether one for complete optimism. We have undoubtedly made progress, and in assessing what factors have been responsible I would put the following in order of preference: (*a*) immunization against diphtheria, (*b*) antibiotics, (*c*) processes of natural immunization, and (*d*) improvement in social conditions, sanitation and hygiene.

But in spite of these factors it seems strange that our infectious diseases wards at Fairfield, although using only about one-third of the number of beds, are almost as busy as they ever were, admitting patients with a greater variety of and more severe infections than was the case fifteen to twenty years ago. It is my opinion that the diminution in the number of fever beds in use has been mainly caused by the virtual disappearance of diphtheria and scarlet fever as diseases requiring admission to hospital, and not by the suppression of infectious diseases as a whole. Twenty years ago diphtheria and scarlet fever patients would occupy four-fifths of the beds in any fever hospital. These cases have now shrunk to a mere fraction of their former number, while admissions for other diseases have remained much the same. Actually in certain diseases there has been quite a considerable increase. Furthermore, some diseases which used to be epidemic now appear to be becoming endemic. Examples in Melbourne are measles, whooping-cough, and I think also poliomyelitis.

[1] Read at a meeting of the New South Wales Branch of the British Medical Association on June 24, 1954.

Other diseases uncommon some years ago are appearing more frequently, although not actually in the form of epidemics. Examples in Melbourne are infectious hepatitis and infectious mononucleosis. There appear to be developing in the community many more febrile illnesses whose identity is difficult to diagnose. Hence the increasing use of the term "pyrexia of unknown origin". The lot of the general practitioner in this regard is becoming more and more difficult, and he finds it necessary to send more patients to hospital for investigation and diagnosis. Lastly, in spite of intensive work we have not yet solved the problem of the prevention of rubella in pregnancy with its threat of developmental deformities.

Undoubtedly the greatest cause for satisfaction has been the virtual conquest of diphtheria by immunization. Even here some authorities hold the opinion that diphtheria was on the wane by natural processes and by improvement in social conditions before active immunization could have become effective. I have seen in the Press that recently there has been an increase in incidence in diphtheria in Sydney. I have heard few details, but such is my faith in immunization that I would confidently predict that the increase will not persist for long. Before leaving the subject of immunization against diphtheria I should like to quote the case of two boys who were playmates. One had been immunized against diphtheria, the other had not. The non-immunized boy was admitted to Fairfield Hospital with very severe faucial diphtheria, and in spite of vigorous treatment he died from cardiac failure. His playmate was admitted on the same day with the same type of organism, but with mild symptoms of diphtheria. After a short illness he returned home well. The lessons to be learnt are, firstly, that it is fair to claim that this boy's life was saved because he had been immunized, and secondly, that in some patients with a virulent infection it is possible for the immunity to be broken down and an immunized child to contract diphtheria. It is a mistake, therefore, to claim that 100% protection is achieved by immunization, even though it may be nearly so.

The lessened incidence and mildness of scarlet fever can be attributed only to the rapid action of penicillin, which quickly clears the pharynx and renders secondary complications unlikely. A reduction in the number of streptococcal carriers in the community is the logical result. As a result of penicillin therapy also more scarlet fever patients are able to be treated at home, and this further increases the number of beds available for other purposes.

However, possibly the most important modern development has been the action of antibiotics in producing a rapid cure and a quicker turnover of patients. I have already mentioned scarlet fever, in which the duration of stay in hospital has been reduced from at least thirty days to an average of about ten days. The bacterial complications of measles, such as bronchopneumonia, also respond rapidly to antibiotics. Even whooping-cough is influenced to some extent by the broad spectrum antibiotics, although not to the extent at first claimed.

To assess the success or otherwise of modern preventive methods in combating the incidence of disease, I suggest that we should analyse the types of infection which are seen by the general practitioner in the home, and also the types for which the patient is now admitted to a fever hospital or to the medical wards of a general hospital. From my own experience I can speak only on the patients now being admitted to Fairfield Hospital. Owing to the small number of cases of diphtheria and scarlet fever, we are able to admit patients with a much wider variety of infections. These patients demand considerable investigation by clinical, laboratory and radiological methods. We may hope that the clinician who is so proud of his clinical judgement that he scorns the correcting influence of the laboratory is now outmoded. A first-class laboratory with a clinical pathologist and a clinical bacteriologist is now an absolute necessity in the modern fever hospital. The modern laboratory is a reliable diagnostic instrument. We should be proud of our Australian laboratories. It seems to me amazing that laboratories in three States are now able to cultivate poliomyelitis virus and to type it, and if necessary could make poliomyelitis vaccine in limited quantities.

We shall now consider the types of diseases for which patients are being admitted to a fever hospital like Fairfield.

Infections of the Respiratory Tract.

We find it difficult to produce sufficient diphtheria patients to teach students, but we admit many patients with other acute inflammatory infections of the pharynx and larynx. For example, we admit 50 to 60 patients a year with the anginose type of glandular fever or infectious mononucleosis. This most interesting disease can closely simulate diphtheria with an extensive membranous formation on the pharynx. Many of these patients are really ill. As we probably deal with only a very small fraction of the cases which occur in Melbourne, this condition surely must be responsible for a considerable amount of absenteeism from schools and factories. I find it hard to believe that this disease was as common twenty years ago and that we missed it. Is this a new disease or an old one in a new guise? Is it due to a new virus or is it just an abnormal response of the lymphoid tissue to an otherwise mild infection? Strange to say, I can find little evidence to show that this disease is easily transmitted.

We now rarely see a patient with laryngeal diphtheria; but other inflammatory obstructive conditions of the larynx appear to be even more frequent than formerly. The staphylococcus, now rapidly taking the place of our old enemy the streptococcus, is commonly seen in cases of laryngotracheitis. We recognize the *Hæmophilus influenzæ* more frequently than we used to. In the larynx it causes a virulent infection of the supraglottic region, with obstructive symptoms and a positive response to blood culture developing in a matter of hours. One wonders whether this organism has not become exalted in virulence.

Streptococcal infections have become relatively mild clinically and respond rapidly to penicillin. However, the Royal Children's Hospital, Melbourne, still admits something like 100 patients with acute nephritis in a year—surely an indication that the streptococcus is still active.

The medical profession is now hardened to the numerous jibes concerning our inability to control the common cold; but we must admit that there is some justification for criticism. Under the strange heading of upper respiratory tract infection we have probably a mixed bag of infections consisting of the common cold, influenza, perhaps virus pneumonia and probably many other virus infections. Most of these are usually not severe enough for the patient to be admitted to hospital; but I wonder whether any general practitioner would say that their incidence has declined in the last twenty years. I would think that most would say the opposite. However, we may justly claim that the mortality from these diseases has been considerably reduced by the action of antibiotics on the secondary invaders.

Bowel Infections.

With all our modern methods of hygiene it seems strange that we still have our annual quota of bowel infections, even though typhoid epidemics are now rare. Undoubtedly the greatest success has been in the reduction of infantile mortality, and here we must give considerable credit to our infant welfare organizations. However, chemotherapy has also played a considerable part, especially in the control of the bacillary dysenteries. When we consider salmonella infections we cannot afford to be so complacent. With the exception of *Salmonella typhi*, these organisms respond very slowly or not at all to antibiotics and are difficult to clear from the bowel. Carriers of these organisms are undoubtedly common in the community, both in adults and in children.

Is infectious hepatitis as we know it nowadays a new disease or a variant of an old one? It seems to be increasing in Melbourne both in incidence and in severity. Possibly fresh strains of the virus may have been intro-

duced into Australia during and since the war. Anyone who has had experience of this disease knows what a crippling effect it can have on whole families, and especially on the adult members. Convalescence is slow and may be complicated by any respiratory infection which readily causes an exacerbation of the jaundice, with, as a rule, further liver damage.

Skin Infections.

Most of the straightforward bacterial infections of the skin, such as erysipelas and furunculosis, respond well to antibiotics. However, we appear to be seeing in Melbourne many more drug sensitivity and allergic phenomena. We also admit, not infrequently, patients with the condition known as Stevens-Johnson syndrome, or *erythema multiforme exudativum*, a most unpleasant disease with multiple bullæ and vesicles on the skin and acute ulceration of the mouth, eyes and genitalia. The ætiology of this condition is quite unknown, yet it is logical to consider that it has an infective basis.

Acute Infections of the Central Nervous System.

Now we approach the subject of acute infections of the central nervous system with a considerable degree of humility. We admit to Fairfield many more patients with these infections than we used to, and it is a fair assumption that the numbers have increased considerably in the community. The syndrome of headache, vomiting, neck stiffness and moderate pleocytosis in the cerebro-spinal fluid must be familiar to every practitioner. For want of a more precise diagnosis we are often forced to call these conditions encephalitis, virus meningitis, benign lymphocytic meningitis or aseptic meningitis—all rather vague terms indicating that we are ignorant of the precise ætiology. After we exclude tuberculous meningitis, some of these cases may be non-paralytic poliomyelitis, a diagnosis made frequently on suspicion or on inference or on slender epidemiological grounds. With the development of tissue culture diagnostic methods we hope that this group will be defined more accurately. A few of these cases may be virus encephalitides such as Murray Valley encephalitis or Port Augusta encephalitis. Some are due to that ubiquitous virus the Coxsackie, a virus about which we know very little in Melbourne, most of the Australian work having been done here in Sydney or Adelaide. The diagnosis of paralytic poliomyelitis is usually straightforward in the presence of a lower motor neuron lesion; but occasionally we have cropping up—and more frequently of late, I think—the condition known as infective polyneuritis, a strange paralytic condition about which we know very little.

I doubt whether there has been much change in the incidence of purulent meningitis. The day of large epidemics of meningococcal meningitis I am sure has passed. We can be justly proud of the improved results of treatment of purulent meningitis; but we must still feel humble when we encounter that most dramatic of all infections, fulminating meningococcal septicæmia.

And now we come with bowed heads to review the subject of poliomyelitis, the most baffling and contradictory of all infectious diseases. Thanks to the painstaking work of Enders, of Boston, we are now entering a new era of hope. Since Enders showed that the virus could be cultivated on growing living human tissue, all kinds of wonderful advances have become possible. Precise laboratory confirmation of the clinical diagnosis is now a possibility, and it appears extremely likely that a successful vaccine will soon be perfected. The present idea of the epidemiology of poliomyelitis is perhaps worth some study. Here we have a disease which appears to contradict all the rules. Countries which have a high standard of living, particularly those in which child welfare is well organized, suffer more from this disease than countries which have a low standard of living and in which child welfare as we know it is almost non-existent. Most interesting work has been done by American workers in Egypt, where it has been shown that at the age of three to four years the great majority of Egyptian children have developed antibodies to all three types of poliomyelitis, while in the United States of America many adults are shown to be susceptible to all three types even up to the third and fourth decades. The results of early tests in Australia indicate similar results to those in the United States of America. In Egypt the occasional infantile type of the disease is seen, but widespread epidemics do not occur. In Melbourne we are seeing more and more of the dreadful adult type of the disease, in which the patient has complete flaccid quadriplegia and paralysis of the respiratory muscles. Some of the less fortunate of these patients recover sufficiently to lead a respirator life. On the evidence of Egypt and other similar countries compared with the United States of America and Australia, it would appear that by the delaying of the process of natural immunization the disease has shifted to the older age groups, in which the severe paralytic form of the disease is more common. As the older age groups are more numerous, we have a greater number of susceptibles and hence the occurrence of large epidemics. It would appear logical to assume that the earlier one meets the virus, the more likely it is that the disease will be subclinical or abortive, or non-paralytic, and immunity to that particular type will be successfully accomplished. Hence our well-meaning advice to parents to keep children away from crowds during a poliomyelitis epidemic may not be ultimately in the best interests of the individual child. Also we have the apparent contradiction that the perfection of our infant and child welfare organizations has prevented natural immunization at an early age. The idea of the older person contracting a disease more severely is not a new one. We have similar examples in measles, chicken-pox and whooping-cough, particularly in country dwellers.

This concept of the epidemiology of poliomyelitis does not, of course, mean that we should discard our modern methods of hygiene and sanitation or our infant and child welfare organization. The answer lies in the preparation of an efficient and safe vaccine, by which to copy Nature and provide all children at an early stage with antibodies to all three types of poliomyelitis virus.

Finally, I should like to try to analyse what is happening to poliomyelitis in the city of Melbourne.

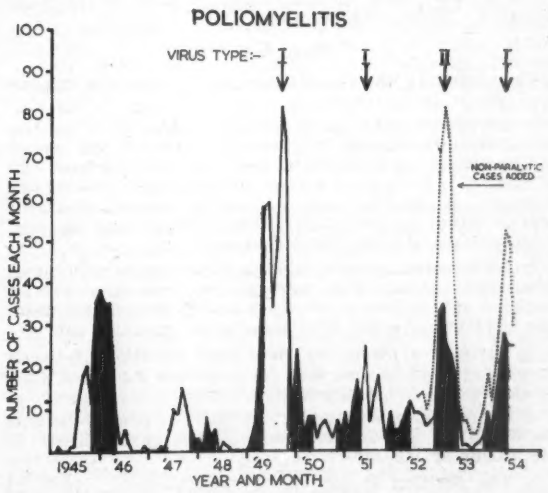

FIGURE I.

Poliomyelitis: monthly incidence of paralytic cases. Solid columns, summer months.

Figure I shows a graph of the monthly admissions to Fairfield Hospital of patients with poliomyelitis. As Fairfield admits about 90% of the patients with acute poliomyelitis in Melbourne, this graph may be accepted as a fairly accurate record of the incidence of polio-

myelitis in the metropolitan area of Melbourne. It will be noted that the graph is on too small a scale to include the great epidemic of 1937-1938. After this epidemic poliomyelitis appeared to disappear from Melbourne until 1945, when we see the first peak. There were then small rises until 1949, when we had another fairly large peak. Since then we can see by the monthly incidence that poliomyelitis has never been entirely absent from Melbourne, and the disease appears to have become endemic. I gather that the same thing is happening both in Sydney and in Adelaide. As one would expect if this was the case, the peaks appear to be flattening out. Isolation of all three types of poliomyelitis virus has been achieved in Melbourne during the last three years, although, as shown in the graph, epidemics have been due to type I except for a rather unique increase in 1952 of type II. We may, therefore, be a little afraid that type III may suddenly assume epidemic proportions. The isolation of the virus types has been made by Dr. P. L. Bazeley and Mr. J. R. Thayer at the Commonwealth Serum Laboratories, and by Dr. A. A. Ferris at the Fairfield laboratory. In 1949 isolations were made by American workers before we had the means for typing. By analysing the age groups who developed poliomyelitis in 1949, E. V. Keogh arrived at the opinion that the 1937-1938 epidemic was also due to type I.

An interesting phenomenon seen in this graph is the frequency of winter epidemics of poliomyelitis in Melbourne. The great 1937-1938 epidemic commenced in Melbourne in June and reached its peak in August, the coldest and wettest month of the year. I should be very surprised if flies had anything to do with the transmission of poliomyelitis virus in a Melbourne winter. On this graph the summer months from November to April are shown solid. The changing age incidence is well shown in the Melbourne epidemics, which appear to indicate that our standard of hygiene and child welfare is of a high order.

Conclusion.

In conclusion we should consider a rather disturbing possibility that other virus diseases or infections may have changed their age incidence through being prevented in childhood, and make their appearance more frequently in adult life. The idea is possibly quite fanciful, but one virus disease which springs readily to mind is infectious hepatitis. There may be others.

Summary.

To summarize, the present position of infectious diseases as I see it is as follows.

1. A fewer number of beds are required in fever hospitals, mainly because of two factors: (*a*) the virtual disappearance of diphtheria and the lessened need for admission to hospital of scarlet fever patients; (*b*) a rapid turnover of patients and a greatly reduced mortality brought about by the action of antibiotics on the bacterial complications of many virus diseases.

2. With the exception of diphtheria, scarlet fever, typhoid fever and possibly also tuberculosis, modern preventive methods and improved social conditions have not lowered the incidence of acute infections to any great extent.

3. There is a possibility that some infections formerly occurring in childhood may have gained increased virulence when attacking susceptible adults.

4. There appears to be an increase in febrile illnesses in which no precise diagnosis can be made either by clinical or by laboratory methods.

5. The position is not one for complacency. There is still much to be learnt and much work to be done.

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ACUTE PANCREATITIS.[1]

By ERIC G. SAINT.

From the Clinical Research Unit, Royal Perth Hospital, Perth, Western Australia.

AVERY JONES wrote in the introduction to "Modern Trends in Gastroenterology" (1952): "Gastroenterology has a greater number of unsolved ætiological problems than any other system of the body." In truth, it could be added that in gastroenterology there is no field at the present date with a greater number of unsolved problems than pancreatitis. Since Opie's classical paper on pancreatitis complicating calculous impaction of the ampulla of Vater (1901), there has been a tendency, amongst surgeons at all events, to relate pancreatitis exclusively to disease of the biliary tract. While it is undeniably true that patients with biliary calculi are as a group more prone to develop pancreatitis than others, careful clinical observation indicates that other quite unrelated factors may be of considerable importance in pathogenesis, the appreciation and understanding of which have a material bearing on the diagnosis and management of the condition.

In this communication the clinical features of 33 cases of acute pancreatitis diagnosed at the Royal Perth Hospital between 1948 and early 1954 are reviewed, with particular respect to the natural history of the disease, the results of treatment, and the probable ætiological factors involved.

CRITERIA OF DIAGNOSIS.

For the purpose of this study cases have been included in which frank macroscopic changes in the pancreas of either gross œdema or necrosis were seen at surgical exploration or autopsy, or in which abdominal pain was associated with the finding of a serum amylase level of over 200 Somogyi units or of urinary diastase levels of above 50 Wohlgemuth units.

INCIDENCE OF ACUTE PANCREATITIS.

It is believed that the recorded incidence of acute pancreatitis (0·22% of all surgical admissions in this hospital) is not a true reflection of its real prevalence in the population. In Table I, showing the number of cases diagnosed each year, it will be noted that nearly half the cases were diagnosed in 1953 and the first half of 1954; the subject of pancreatitis has come up for discussion on several occasions at clinical meetings, and in consequence it is probable that there now exists a heightened index of clinical suspicion of the disease.

TABLE I.

Number of Cases of Acute Pancreatitis Diagnosed Each Year in the Royal Perth Hospital (Approximately 80 Surgical Beds).

Year.	Number of Cases Diagnosed.
1948	3
1949	6
1950	2
1951	4
1952	2
1953	9
1954 (January to May)	7

Acute pancreatitis is about one-fifth as common as perforated peptic ulcer (Figure I). The necessity for early exploration in the latter more frequently encountered condition overshadows the diagnosis of pancreatitis ("We'll just make sure"), and accounts for the frequency with which the abdomens of patients with acute pancreatitis were explored.

[1] The substance of this paper was read at a meeting of the Western Australian Branch of the British Medical Association, May, 1954.

Age and Sex Distribution.

There was no significant sex difference (females 18, males 15); but in age distribution certain trends were discernible (Figure II)—notably, the susceptibility to pancreatitis of the younger male and of the elderly female. This at once suggests that probably unrelated ætiological influences are at play.

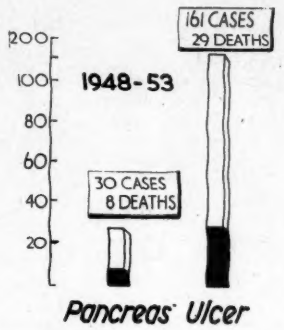

Figure I.

The incidence of acute pancreatitis in comparison with that of perforated gastric or duodenal ulcer.

Clinical Features.

The sudden onset of upper abdominal pain accompanied by vomiting forms the basis of clinical diagnosis. Since the pathology of pancreatitis covers a spectrum including small focal hæmorrhage, generalized œdema or widespread hæmorrhagic necrosis, it is clear that symptomatology will be variable. Patients have been classified as suffering from "mild", "moderate" or "severe" disease according to the severity and duration of pain and the presence or absence of shock, as follows: "mild"—pain of less than thirty-six hours' duration, no shock; "moderate"—pain of longer than thirty-six hours' duration, no shock; "severe"—pain of greater than forty-eight hours' duration, shock considerable.

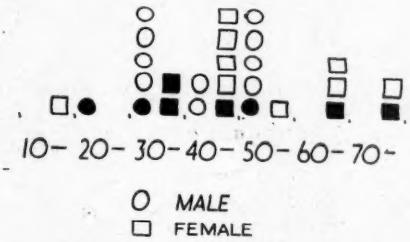

Figure II.

Age and sex distribution of 27 cases of acute pancreatitis, January, 1948, to November, 1953. Black circles and squares indicate fatal outcome.

The site of pain in these cases is shown in Figure III. It is felt characteristically in the epigastrium, with radiation to the left and right upper quadrants and occasionally to the right or left shoulder tip. Radiation to the back at the level of the seventh to the eleventh dorsal vertebræ when it occurs is an almost diagnostic symptom. However, when the pain of pancreatitis is localized to a particular abdominal quadrant or is in the back, diagnostic confusion may be considerable. The pain is characteristically of boring unremitting quality, a feature which is usually sufficient to differentiate pancreatitis from renal or biliary colic, or from intestinal obstruction.

The vomiting of pancreatitis may be most severe and persistent, and may lead to considerable electrolyte imbalance (usually hypochloræmic hypokalæmic alkalosis). Less frequently, when acute diabetes is a complication, the degree of acidosis may be severe. Persistent vomiting may overshadow the associated pain in symptomatological importance.

Transient jaundice, rarely lasting longer than three or four days, was noted in four cases. This symptom may also be misleading, since the association with right-sided pain may suggest the diagnosis of obstructive jaundice due to a stone in the common duct. Two patients, both alcoholics, had small hæmatemeses of about six ounces of bright blood within twenty hours of the onset of pancreatic pain.

Figure III.

Site and radiation of pain, and of rigidity, in 33 cases of acute pancreatitis.

The degree of shock in pancreatitis is variable and commensurate with the extent of necrosis throughout the organ. Patients admitted to hospital with the most intense degree of peripheral circulatory failure rarely recovered. Although surgical text-books sometimes refer to intense cyanosis as being a particular feature of the shock in necrotic pancreatitis, it was found that it was clinically impossible to differentiate shock in pancreatitis from that due to perforation of a peptic ulcer. Abdominal rigidity of greater or lesser extent was present in all cases. It was usually confined to the upper half of the abdomen, but was occasionally more generalized. A point of some help in the differential diagnosis of acute pancreatitis from the peritonitis of perforated ulcer was that in the former condition the severity and extent of abdominal rigidity did not always seem commensurate with the severity of the abdominal pain.

The conditions with which pancreatitis was most readily confused were as follows: perforated peptic ulcer, biliary colic, right basal pneumonia, intestinal obstruction, general peritonitis, myocardial infarction, acute cholecystitis, renal colic, dissecting aortic aneurysm, uncomplicated gastric or duodenal ulcer.

In 17 instances patients were submitted to surgical exploration shortly after their admission to hospital, most commonly with a provisional diagnosis of perforated ulcer. In these cases no recourse was had to ancillary aids to diagnosis; in the remaining cases there was ample evidence to confirm the value in diagnosis of estimation of the serum amylase level (Figure IV) during the acute stage of the disease. In five cases serum amylase and urinary diastase estimations were performed in parallel within forty-eight hours of the onset of pain; significant elevation of enzyme levels in both tests was noted. However, urinary diastase estimations are open to the theoretical objection that in severe shock the excretion of starch-splitting enzyme may be impaired. On the few occasions that serial amylase tests were performed, levels remained significantly above normal for at least three days, which indicates that the test is of undoubted value within a time-limit of forty-eight hours of the onset of pain.

Grollman and his colleagues (1950) have described the radiological appearances of the abdomen in acute pancreatitis. These include generalized dilatation of the bowel with demonstrable fluid levels, the presence of free fluid in the abdomen, and the frequent appearance of what they described as a "sentinel loop" of dilated small bowel in the upper abdominal quadrants. All these radiological signs were noted in many cases in this series, but could not be regarded as being pathognomonic, since they are not always present, and also because they appeared in bowel obstruction and general peritonitis due to other causes. Too great a reliance therefore must not be placed in diagnosis on the information supplied by scout films of the abdomen.

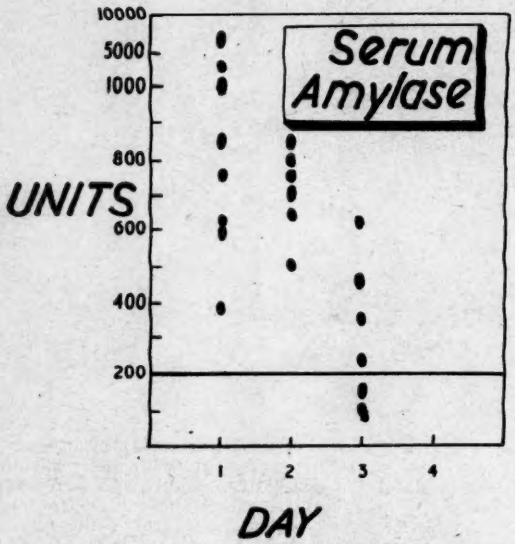

FIGURE IV.

Serial estimations of serum amylase content in six cases of acute pancreatitis (normal, 200 Somogyi units *per centum*).

TREATMENT AND PROGRESS.

Ten patients—almost one-third of the group—died, usually within a few days of the onset of acute pain. In comparison with some published series, this appears at first sight to be an unusually high mortality rate; but few authors have specified the composition of their groups of cases with respect to the age of patients and the severity of symptoms and signs, or as to whether the pancreatitis was but a manifestation of systemic disease. All these factors are of importance and must be taken into consideration when comparisons are made between published series of cases. Deaths were confined to the large group of patients in whom the disease was of catastrophic onset with profound peripheral circulatory failure (Figure V); and in Table II it will be noted that pancreatitis was but the accompaniment of more serious life-endangering disease in four cases (V, VI, VIII and IX).

The milder cases were treated with analgesics only (morphine or pethidine). Morphine was quite as effective at relieving pain as pethidine, and did not appear to prolong the illness, which indicates that the qualms which have been expressed regarding its use in pancreatitis are without foundation. Morphine is said to increase the tone of the sphincter of Oddi, causing obstruction of the flow of pancreatic juice; but on the other hand there is also evidence that it suppresses the secretion of pancreatic juice by the acinar cells (Lagerlof, 1947). When pain and vomiting were persistent, when shock was severe, and after abdominal exploration, continuous gastric aspiration was resorted to, with the use of intravenous infusions of plasma, glucose and saline, and normal saline. Most patients received conventional doses of penicillin and streptomycin.

It is of considerable importance to know whether surgical interference contributes towards mortality. For the purposes of comparing groups in which surgical exploration was carried out and those in which it was not, the four cases in which death was due to vascular or systemic disease (Cases V, VI, VIII and IX, Table II) have been excluded from consideration. The two groups are comparable with respect to the proportion of "severe" cases in each, and in age distribution. Exploration was carried out in 14 cases, in three cholecystectomy and choledochostomy were performed, in three the gall-bladder was drained, and in eight the abdomen was merely opened and closed, with drainage of the lesser sac in three. There were three post-operative deaths, two following simple exploration and one following drainage of the common duct. Three deaths also occurred among the 15 patients not subjected to exploration.

The important complications of pancreatitis were sloughing and infection of the pancreas with the formation of abscesses and cysts, the spread of infection to other areas causing general peritonitis and subphrenic abscess, pulmonary collapse and bronchopneumonia, paralytic ileus, and acute *diabetes mellitus*. The incidence of some of these infective complications, which occurred frequently and despite the routine use of penicillin and streptomycin, is shown in Figure VI. The practice of instituting external drainage of the lesser sac at laparotomy appears to be fraught with some hazard, for it is probably significant that in two of the three cases in which this was done pancreatic fistulæ, from which pure cultures of penicillin-insensitive *Staphylococcus aureus* were grown, subsequently

TABLE II.

Clinical Features and Autopsy Findings in Ten Fatal Cases of Acute Pancreatitis.

Case Number.	Sex.	Age. (Years.)	Clinical Features.	Autopsy Findings.
I	M.	27	Old paraplegia; pain, shock.	Pancreatic necrosis; old injury to spinal cord.
II	M.	32	Pain, shock; surgical exploration.	Pancreatic necrosis. Gall-bladder normal.
III	F.	38	Obesity; recurrent abdominal pain in puerperium; shock.	Pancreatic necrosis. Gall-bladder: multiple calculi; common bile duct normal.
IV	F.	37	Obesity; acute pain; shock; surgical exploration.	Pancreatic necrosis. Gall-bladder; multiple stones; common bile duct normal.
V	F.	47	Malignant hypertension; abdominal pain.	Pancreatic necrosis and abscess. Hypertensive nephropathy.
VI	M.	55	Acute retrosternal pain; shock. Serum amylase content, 450 units *per centum*.	Dissecting aortic aneurysm with rupture into pericardium; focal hemorrhages in pancreas.
VII	M.	59	Alcoholism; acute pain and shock.	Pancreatic necrosis; fatty liver.
VIII	F.	60	Diabetes; retrosternal pain; serum amylase content, 2200 units *per centum*.	Recent myocardial infarction with perforation of interventricular septum. Pancreatic atrophy. Fatty liver.
IX	F.	60	Diabetes; acute abdominal pain; neuropathy: urinary porphyrins present.	Recent fat necrosis in an atrophied pancreas: changes in central nervous system and liver typical of acute porphyria.
X	F.	75	Acute abdominal pain; exploration—bile peritonitis and pancreatitis.	No autopsy performed.

developed. In the earlier days the profound electrolyte imbalance which is now known to complicate pancreatitis and the continued aspiration of physiological secretions was not universally appreciated; prolonged paralytic ileus was then a more frequent complication. Transient glycosuria occurred in three patients, and in three patients who were known to have been diabetic previously, considerable worsening of the diabetic state was noted.

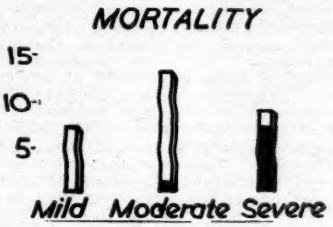

FIGURE V.
Relationship of severity of acute pancreatitis, as judged by degree of shock and prolongation of pain, to mortality.

ÆTIOLOGY OF ACUTE PANCREATITIS.

As a result of information derived from the histories of patients, from physical examination, from biochemical tests and from subsequent radiological examination of the gall-bladder and alimentary canal, it is possible to separate cases into at least five ætiological groups (Table III), as follows: pancreatitis associated with peptic ulcer, pancreatitis complicating cardio-vascular disease, alcoholic pancreatitis, pancreatitis associated with the presence of biliary calculi, and a group of cases in which it was not possible to ascribe any particular ætiological factor with certainty. It should be of considerable interest that in a typical Australian community in less than one-quarter of cases was there any positive evidence of the presence of biliary calculi.

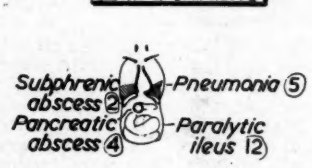

FIGURE VI.
Incidence of some of the common complications of acute pancreatitis (33 cases reviewed).

Peptic Ulcer.

When the pain of peptic ulcer becomes unremitting and radiates to the back, penetration of the ulcer into the pancreas is always suspected. An attack of prolonged upper abdominal pain in a patient with a peptic ulcer calls to mind the likelihood of a small perforation with localized abscess formation. However, another possibility to be considered is the extension of acute inflammation to a wide area of the pancreas surrounding the base of an adherent ulcer.

A tram driver, aged fifty-three years, known to have had a chronic duodenal ulcer with a typical pain pattern for fifteen years, was admitted to hospital with a history of severe epigastric pain and repeated vomiting of twelve hours' duration. The pain radiated to the back. There was pronounced guarding of the upper right abdominal quadrant, and it was thought that his ulcer had perforated. However, X-ray films of the abdomen failed to reveal gas under the diaphragm, and the urinary diastase level was found to be in excess of 620 units. The pain gradually subsided over three days. A subsequent X-ray examination with a barium meal confirmed the presence of a chronic duodenal ulcer.

Direct trauma to the head of the pancreas or interference with its blood supply may occur as a result of the technical difficulties involved in the mobilization of chronic adherent duodenal or gastric ulcers during gastrectomy, or in the course of common bile duct surgery. Pancreatitis following gastrectomy has been reported on by Millbourne (1949), by Warren (1951), and by Dunphy, Brooks and Ackroyd (1953). The significance of the resultant post-operative pain may not be appreciated at the time, and the complication may be extremely hazardous, inasmuch as release of pancreatic enzymes may lead to the development of life-endangering pancreatic or duodenal fistulæ.

TABLE III.
Ætiological Classification of 33 Cases of Acute Pancreatitis.

Probable Ætiology.	*Number* of Cases.	Clinical Features.
Peptic ulceration ..	3	Deep penetration of gastric or duodenal ulcer into pancreas, or following trauma during subtotal gastrectomy.
Vascular disease ..	6	Pancreatic pain or evidence of pancreatic necrosis in course of porphyria (two cases), malignant hypertension (one case), acute coronary disease (two cases), and dissecting aortic aneurysm (one case).
Cholelithiasis ..	6	Often recurrent attacks of pain which may persist notwithstanding cholecystectomy.
Alcoholism ..	6	Recurrent attacks of pain, usually following severe drinking bouts.
Cause unknown ..	12	Often associated with arterial hypertension or hypercholesterolæmia, or a family history of diabetes mellitus.

A housewife, aged forty-three years, complained for six months of a severe pain in the back at the level of the seventh dorsal vertebra, from which she obtained only occasional relief. She did not complain of indigestion and had received treatment for "spondylitis". On investigation she was found to have a large gastric ulcer on the lesser curvature. At laparotomy this was found to be firmly adherent to the pancreas, which displayed œdematous induration well beyond the area of ulcer penetration. After operation she complained of considerable deep-seated upper abdominal pain, and the serum amylase level was found to be 537 units.

I am grateful to Dr. Donald Fleming for permission to publish the records of the following case, not included in the present series:

A man, aged fifty-three years, underwent a Pólya gastrectomy for a chronic posterior duodenal ulcer causing pyloric stenosis. The ulcer was firmly adherent to the pancreas, and in dissection of the duodenum from the pancreas it was found necessary to leave the floor of the ulcer behind. His course was satisfactory until the fifth post-operative day, when he began to vomit continuously and was found to have a tender distended abdomen. A straight X-ray examination of the abdomen showed a large distended loop of jejunum with free fluid in the abdominal cavity. A significant finding in the blood chemistry was a serum calcium level of 7·4 milligrammes per 100 millilitres. Perforation of the duodenal stump or intestinal obstruction was suspected, and surgical exploration was carried out. About two pints of cloudy, foul-smelling fluid were removed. There was massive fat necrosis of the mesocolon and omentum. The jejunum was obstructed by a kink caused by the adherence of omentum. The pancreas was a sloughing mass of necrotic tissue. The lesser sac was drained. After operation up to 14 ounces a day of pancreatic juice drained away; this caused considerable wound digestion and local hæmorrhage. Despite intravenous therapy he died three weeks after the onset of his post-operative pancreatitis.

Vascular Disease.

In the following cases it seemed reasonable to attribute the pancreatitis to interference with the blood supply of

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the pancreas due to structural changes in the walls of small vessels or to altered circulatory dynamics.

Porphyria.

Strictly speaking, acute intermittent porphyria is a metabolic disease (Schmid, Schwartz and Watson, 1954); but there is some evidence to suggest that symptoms and signs owe their origin to diffuse ischæmic changes in the organs due to spasm of the smooth muscle of vessels (Denny-Brown and Sciarra, 1945). Elsewhere (Saint *et alii*, 1954) we have reported in detail two cases of intermittent porphyria in which there was unequivocal evidence that mild pancreatitis was the probable cause of abdominal pain. A female patient, aged twenty-four years, complaining of pain with radiation to the back, was found to have a serum amylase level of 450 units *per centum*, and to be excreting porphobilinogen and the Waldenstrom uroporphyrin complex in the urine; and a patient, aged sixty years, with known hypertension and mild diabetes, died after an illness which began with upper abdominal pain and progressed to severe neuropathy and stupor. The urinary findings were typical of acute porphyria. At autopsy evidence of recent pancreatitis was present.

Malignant Hypertension.

An obese woman, aged forty-nine years, underwent a Smithwick sympathectomy for severe progressive hypertension with grade IV retinopathy and congestive heart failure. Six months later she developed severe abdominal pain and vomiting. The pain subsided after four days, but she died six weeks later with uræmia and pulmonary œdema. The blood pressure was 240 millimetres of mercury, systolic, and 160 millimetres, diastolic. At autopsy enormous left ventricular hypertrophy, pulmonary œdema and malignant hypertensive nephropathy were present, and the pancreas, which was almost completely atrophied and spotted with areas of fat necrosis, contained a large abscess in its head.

It is conceivable that ischæmia due to severe arteriolosclerosis was the cause of the diffuse pancreatic necrosis in this case. The pathology of the pancreas in malignant hypertension in autopsy material has been reviewed by Mayo Clinic workers (Hranilovitch and Baggenstoss, 1953). Although they observed that areas of focal necrosis and atrophy were present in a large proportion of glands, these authors were not of the opinion that arterial disease was of its own accord a significant factor in the ætiology of hæmorrhagic pancreatitis. However, this particular case report, and the fact that 22 patients—two-thirds of the patients in the whole group of cases of pancreatitis—had diastolic blood pressures of over 100 millimetres of mercury (which is a considerably higher incidence of diastolic hypertension than would be expected in a control group of patients with this age composition), are arguments in favour of a direct or indirect causal relationship between arterial hypertension and pancreatic necrosis.

Acute Coronary Disease.

In the two following cases symptoms and signs of pancreatic disease were obscured by the more dramatic manifestations of myocardial infarction. The evidence of pancreatic involvement was biochemical rather than pathological.

An obese, diabetic female patient, aged seventy-six years, had been having recurrent attacks of biliary colic for several years, and was admitted to hospital with acute retrosternal pain radiating down both arms. She also complained of pain below the right costal margin and vomiting. On examination she was shocked and had oliguria, and tenderness and rigidity were present in the right upper quadrant of the abdomen. Investigations revealed electrocardiographic evidence of a probable recent posterior infarction, a blood sugar content of 400 milligrammes per 100 millilitres, and a serum amylase level of 350 units *per centum*.

It was difficult to interpret the sequence of events in this case. Did myocardial ischæmia occur in consequence of the reflex circulatory changes brought on by acute pancreatitis, or vice versa?

A female patient, aged sixty years, had been treated for two years for angina of effort and dyspnœa on exertion. A week before her admission to hospital she complained of severe retrosternal pain, pain in the right upper abdominal quadrant, and vomiting. Her condition worsened and she was admitted to hospital in a state of peripheral circulatory failure. The heart was fibrillating and the sounds at all areas were obscured by a harsh systolic murmur. The liver was enormously enlarged and tender. The urine was loaded with sugar and ketone bodies. The electrocardiogram showed a pattern of left bundle branch block. The blood sugar content was 560 milligrammes per 100 millilitres, and the carbon dioxide combining power was reduced to six milliequivalents of bicarbonate per litre of blood. The serum amylase content was 2200 units *per centum*. At autopsy recent anterior infarction with early aneurysm formation was noted, and a small perforation of the interventricular septum was present. The liver was enormously enlarged, and examination of sections revealed an extreme degree of fatty change. The pancreas was atrophic, but showed no macroscopic evidence of extensive hæmorrhage or necrosis. Examination of sections revealed replacement of large areas of acinar tissue by fatty tissue and a moderate degree of interstitial fibrosis. There was surprisingly little sign of necrosis of acinar cells or of inflammatory cell invasion. Since serial sections of the whole pancreas were not taken, it is possible that areas of focal necrosis may have been present in other sites. Indeed, if this was not the case, it would otherwise be difficult to explain the finding of such a high serum amylase level in the blood.

Dissecting Aortic Aneurysm.

A plethoric clerk, aged fifty-five years, who was known to have had hypertension "for years", was admitted to hospital in a state of collapse after complaining of a sudden tight feeling in the chest at work. The pulse could hardly be felt, and the systolic blood pressure was only 70 millimetres of mercury. An elecrocardiogram showed no evidence of myocardial infarction. The serum amylase content was 450 units *per centum*. He died after eleven hours, and at autopsy it was seen that a dissecting aneurysm of the arch of the aorta, which was grossly atherosclerotic, was present. The pericardium contained about 200 millilitres of blood. Distally dissection had proceeded as far as the origin of the left subclavian artery. The abdomen contained a pint of serosanguinous fluid. Examination of the pancreas revealed a few areas of focal hæmorrhage. The liver was enlarged and fatty. Both kidneys were the site of polycystic disease.

Alcoholism.

That acute pancreatitis is a complication of chronic alcoholism is still not widely appreciated, for it is only within the last eight years, since the publication of Comfort, Gambill and Baggenstoss's paper in 1946, that the unfavourable course which this form of pancreatitis may take has been fully recognized.

The six patients in this group were all males, and were not of advanced age (twenty-five, thirty-four, thirty-eight, forty, fifty-six and fifty-nine years). They were all consistently heavy beer, whisky and wine drinkers with diet patterns of high caloric intake (as carbohydrate and alcohol) and of low protein (as low as 20 grammes daily), fat and vitamin intake. They were inclined to obesity. None were found to have evidence of disease of the biliary tract. One patient died; his history is as follows:

A man, aged fifty-nine years, was admitted to hospital in a state of shock and stupor. For many months he had been drinking four bottles of cheap wine daily. On examination of the patient his pulse was of poor volume, the abdomen was rigid, the liver was apparently enlarged, and the knee and ankle jerks were not elicited. At autopsy acute pancreatic necrosis was found with widespread fat necrosis in the peritoneal cavity. The gall-bladder contained no stones.

In all these alcoholic patients pancreatitis of varying degree of severity was a recurrent phenomenon. Sometimes the attacks of pain were of such short duration that differentiation from the pain of peptic ulcer or gastritis was extremely difficult.

A refrigerator worker, aged fifty-six years, began to drink heavily and neglected his diet after the death of his wife. The daily occurrence of pain in the epigastrium with radiation to the back was interpreted as being due to an ulcer, particularly as he often wakened with it at night. Over the Christmas holidays he drank even more heavily than usual and was admitted to hospital with a typical attack of acute pancreatitis. The serum amylase level was 700 units on the second day. The pain on this occasion differed from his previous pain only by virtue of its unusual

prolongation. An X-ray examination with a barium meal revealed a perfectly normal stomach and duodenum, and a test meal examination revealed achlorhydria.

A yardman, aged thirty-eight years, a heavy drinker, had complained of epigastric pain with radiation to the back for four years. The pain would occur at intervals of three or four months, and would last with varying intensity for three weeks. He was admitted to hospital during a more severe episode of pain and was subjected to surgical exploration with a provisional diagnosis of perforated duodenal ulcer. The stomach and duodenum were normal, but the pancreas was described as being œdematous and indurated, and a few spots of fat necrosis were seen on the surface. The urinary diastase excretion was found to be 700 units *per centum*.

It was thought possible that the onset of pain in "alcoholic" pancreatitis might be related in time to the imbibition of large quantities of liquor; but an analysis of the circumstances of 12 recurrent attacks in three cases failed to reveal any constant time relationship. Pain occurred at intervals of time varying from a few moments after the patient commenced to drink to several hours after the last drink had been taken before he retired to bed. Clinical evidence of malnutrition—peripheral neuropathy in two cases, and the presence of a fatty liver proved by biopsy in three cases—was striking.

Cholelithiasis.

There were six cases (five female patients, one male) in which it seemed reasonable to link the presence of gall-stones with pancreatitis. The ages of the patients were thirty-seven, forty-three, forty-nine, fifty, sixty-eight and seventy-five years. There were two deaths. A careful study of these patients would seem to indicate that in most cases, at all events, the relationship between cholelithiasis and pancreatitis was coincidental rather than causal.

An obese woman, aged thirty-seven years, without any previous history of biliary colic or jaundice, was admitted to hospital with right-sided upper abdominal pain radiating to the back, and vomiting. She was not jaundiced. She died several hours after laparotomy, which had revealed pancreatic necrosis. Although the gall-bladder at autopsy was found to be full of stones, there was no evidence of their migration from that site, and the common duct was of normal appearance and diameter.

An obese woman, aged sixty-eight years, had an attack of supposed biliary colic. The fact that this pain lasted for ten hours without remission vitiates the use of the word "colic"—she probably had pancreatitis. Twelve months later she had a further attack of pain which radiated around the upper part of the abdomen like a girdle. She was not jaundiced. At exploration acute pancreatitis was found. The gall-bladder contained multiple stones, but the common duct was not dilated and contained no stones.

It would seem that the type of case of acute pancreatitis which Halstead (1901) and Opie (1901) originally described, in which a small calculus was impacted in the sphincter of Oddi, is a great rarity. In none of the cases of this group had calculi migrated from the gall-bladder into the common duct, and it was as reasonable to suppose that whatever metabolic abnormalities had led to the production of biliary calculi had also caused the pancreatitis, as that the calculi had caused the pancreatitis. Removal of a gall-bladder full of stones was no certain means of preventing further attacks of pancreatitis.

A man, aged fifty-four years, had acute pancreatitis with typical pain distribution. A gall-bladder full of calculi was removed. He continues to have at monthly intervals attacks of precisely similar pain, with radiation to the back, lasting up to twelve hours. Elevation of serum amylase levels has been noted on two of these occasions.

"Cause Unknown" (Twelve Cases).

In four cases the pancreatitis was of obscure ætiology.

An arc welder, aged thirty-six years, had one attack of typical acute pancreatitis. All investigations gave negative results. The only observation of possible relevance was that he had previously been having frequent attacks of "metal fume fever".

An electrician, aged forty-two years, had two attacks of pancreatitis in three years. Investigations of the biliary and alimentary tracts and tests of liver function gave normal results. His history is of interest in that he continues to have occasional twinges of pain in the epigastrium and the back; a "spot" serum amylase test gave the result of 224 units *per centum*.

A man, aged twenty-seven years, who had been paraplegic since a spinal injury at the age of thirteen years, died from shock due to necrotic pancreatitis. Autopsy failed to reveal the underlying cause.

In five cases there was suggestive evidence that pancreatitis, recurrent in all instances, might be a complication of the type of disordered lipide metabolism encountered in gross obesity, *diabetes mellitus* and familial hypercholesterolæmia.

An overweight girl, aged nineteen years, had an attack of pancreatitis at the age of fourteen years. Subsequently she had short bouts of similar pain at six-monthly intervals. Her blood pressure is 154 millimetres of mercury, systolic, and 104 millimetres, diastolic, and her serum cholesterol content is 400 milligrammes *per centum*.

A man, aged fifty-three years, has had six attacks of acute pancreatitis since 1944, for two of which he has been admitted to hospital. His father, a brother and a sister have died of diabetes. His sugar tolerance curve rises to 200 milligrammes *per centum* and falls slowly, and his serum cholesterol content is 445 milligrammes *per centum*.

An enormously obese woman, aged forty-five years (five feet in height, 15 stone in weight), was admitted to hospital with acute abdominal pain. Her serum amylase level was over 3000 units *per centum*. There was no evidence of the presence of gall-stones.

In three elderly females the only associated abnormality was a significant degree of arterial hypertension, and it is tempting to place these cases in the category described above, that of pancreatitis complicating vascular disease.

A woman, aged sixty-six years, of slim build, had two attacks of proven pancreatitis, in 1952 and 1953, one complicated by a subphrenic abscess. The gall-bladder and alimentary tract were normal on inspection at laparotomy. The only other finding was that of significant hypertension (200 millimetres of mercury, systolic, and 110 millimetres, diastolic) without albuminuria, enlargement of the heart or retinopathy.

A woman, aged seventy years, complained of moderately severe upper abdominal pain with radiation to the back, and was found to have a serum amylase content of 400 units *per centum*. The pain persisted for several weeks with daily fluctuation in intensity, suggesting a diagnosis of duodenal ulcer. A cholecystogram and an X-ray examination with a barium meal gave negative results, and she had histamine-fast achlorhydria. Her blood pressure was 220 millimetres of mercury, systolic, and 130 millimetres, diastolic. The heart was not appreciably enlarged, but albuminuria was consistently present.

Discussion.

By a process of clinical reasoning it has been possible to arrive at a classification of pancreatitis into infective, traumatic, nutritional, metabolic (the obesity-diabetes-gall-stone diathesis) and possibly vascular forms. The natural history of these subgroups is dissimilar, and, although treatment of the acute attack presents a single problem, the subsequent management of patients demands an awareness of the significance of the underlying causative factors. It is probable that it is the failure to take cognizance of these causative factors which has led to the astonishing diversity of views that have been expressed on how patients with both acute and chronic pancreatitis should best be treated.

This study has also indicated that our knowledge of the natural history and symptomatology of pancreatitis is inadequate. Pancreatitis in alcoholic patients is nearly always, and in patients with cholelithiasis very frequently, a recurring affliction. Retrospective clinical history taking indicated that in nearly two-thirds of cases the attack of pancreatitis for which the patients were admitted to hospital was not the first they had experienced. Furthermore, patients with previous attacks yielded the important information that abdominal pain often had qualities not likely to call to mind a diagnosis of pancreatitis. Recurrent pain was often of fleeting nature, lasting but an hour or two, and localized to a very limited area in the upper part of the abdomen or the back. The periodicity of the pain

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led to an erroneous clinical diagnosis of duodenal ulcer in many males, causing in the minds of the surgeons a strong bias in favour of a diagnosis of perforated ulcer when patients were admitted to hospital with a more severe, prolonged attack of pancreatitis. Hitherto the serum amylase test has been used almost entirely in the differential diagnosis of the acute abdominal emergency; but experience suggests that its use could be extended to a wider field in the diagnosis of abdominal pain of obscure ætiology.

It is possible only to speculate on the genesis of pancreatitis in the majority of cases studied. Ulceration of the base of a peptic ulcer into the pancreas leads presumably to some peptic digestion of the surrounding gland; the surprising fact is how localized the area of induration may be when the ulcer is large and there are high levels of acid and pepsin in the gastric juice. The acute pancreatitis which occasionally complicates subtotal gastrectomy or common bile duct surgery has been attributed by Dunphy and his colleagues (1953) to a combination of the inevitable interference with the vasculature of the pancreas and temporary obstruction of the main pancreatic ducts.

There is substantial clinical and experimental evidence that pancreatitis complicating alcoholism may have a nutritional basis. Necrosis of pancreatic acinar cells has been produced in rats (Fitzgerald, 1952), and in dogs, cats and monkeys (de Almeida and Grossman, 1952), by means of parenteral administration of ethionine, an analogue which blocks the utilization of the essential amino acid methionine. Wachstein and Meisel (1954) have produced atrophic lesions in the pancreas of rats by giving them protein-free diets. These lesions can be prevented by giving supplements of methionine or casein. Moreover, Kalser and Grossman (1954) have shown that in ethionine pancreatitis in dogs a decreased amount of trypsin inhibitor in the pancreas is associated with the presence of increased amounts of free trypsin in pancreatic juice. It is permissible to apply these experimental findings to man. Patients with alcoholic recurring pancreatitis gave diet histories of prolonged protein starvation. Deficiency of methionine may cause necrotic changes in the acinar cells; extension of areas of necrosis sufficient to cause clinical symptoms may be due to the excessive secretion of pancreatic juice in response to the continued presence of large amounts of alcohol in the stomach. Although there was no correlation between the time of drinking and the onset of pancreatic pain, attacks of pancreatitis did follow bouts of prolonged indulgence. These speculations may be wide of the mark, but they offer some foundation for the advice that the management of these patients should include strict avoidance of alcohol and maintenance on a protein-rich diet.

There are several objections to the view that biliary calculi are the cause of pancreatitis. The proponents of this hypothesis believe that where a common channel of outlet of the common bile duct and pancreatic duct into the duodenum exists, reflux of bile into the pancreas may occur. In the first place, in the majority of cases studied calculi had not moved from the gall-bladder, and increase of tone of the sphincter of Oddi would have to be postulated to explain the development of a head of pressure high enough to force bile into the pancreatic duct. Even in Halstead's case (1901) it has been objected that the bile staining of the pancreas, which formed the basis of the regurgitation argument, may have been the result of vigorous squeezing of the gall-bladder at autopsy. In the second place "it is not always easy to produce pancreatitis in animals (by injecting bile into the pancreatic duct), nor can one be certain that a given procedure will produce lesions with the same degree of certainty" (Elman, 1954). Palmer (1952) was able to produce experimental hæmorrhagic pancreatitis only by such unphysiological means as injecting mixtures of commercial trypsin and taurocholate into the main pancreatic duct, and following this by ligation.

It is therefore justifiable to assume, as other authors have done (Davies, Moore and Wynn-Williams, 1953), that the association of pancreatitis and cholelithiasis is coincidental. However, this does not simplify the problem. Clinical study offers two possible clues: some of the patients manifested evidence of disordered fat and cholesterol metabolism, while others had associated hypertensive vascular disease. Klatskin and Gordon in 1952 reviewed the evidence that there exists a causal relationship between hyperlipæmia and relapsing pancreatitis, quoting from their own experience and from several case reports in the literature. Hyperlipæmia with hypercholesterolæmia is an uncommon inherited disorder, but is also a biochemical finding in many patients with *diabetes mellitus* and in others of the obese endomorphic constitutional type, of whom in the present study there were so many examples. Now it is precisely this type of patient who is prone to develop gall-stones. If this hypothesis, that both cholelithiasis and pancreatitis have a common origin in metabolic disorder, can be sustained, it yet remains to be discovered how disordered lipide metabolism produces pancreatitis.

That vascular lesions may cause acute pancreatitis is amply illustrated by some of the case reports presented. The finding of high serum amylase levels following coronary occlusion is a novel observation, and appears to confirm the finding of Burn (1951) of acute pancreatitis complicating recent myocardial infarction. It is conceivable that a fall in blood pressure following myocardial infarction may cause acute necrosis of the pancreas without local thrombosis or embolism, like the ischæmia which is known to occur in the cerebral hemispheres or in the bowel in states of extreme hypotension in patients with severe generalized vascular disease. In patients with associated hypertensive and atherosclerotic vascular disease, but without preceding circulatory failure, it is probable that pancreatitis is due to ischæmia following thrombosis of end arteries supplying the organ.

It follows logically from these speculations that surgery has no part to play in the treatment of acute pancreatitis. It is to be hoped that the astonishing advice of Davies, Moore and Wynn-Williams (1953), that "exploratory laparotomy is indicated even if there appears to be no doubt about the diagnosis", will not be followed. These authors held that it was necessary to assess by direct vision the extent of destruction of the organ, establishing free drainage if gangrene or suppuration was present. The available evidence indicates that the risk of developing complications is actually increased by immediate surgical interference.

In fact, the argument in favour of conservative treatment, if the diagnosis can be confidently established, is overwhelming. The pain is relieved by pethidine or morphine. Antibiotics active against Gram-negative organisms should be used in severe cases. The pancreas should be rested, by preventing stimulation of the release of secretin (by continuous gastric aspiration) and by blocking vagal impulses to the gland (atropine or "Banthine" being used). Intravenous fluid replacement is necessary. In large general hospitals biochemical control of electrolyte replacement is a relatively simple matter; but in small country hospitals more rule-of-thumb methods have to be followed. Each litre of aspirated gastric juice should be replaced quantitatively with normal saline. The loss of fluid in urine and by insensible loss should be quantitatively replaced by glucose in N/5 saline. If aspiration is continued for longer than forty-eight hours, and if urinary output is well maintained (over 20 to 30 ounces daily), it is necessary to add two to four grammes of potassium chloride to the intravenous drip infusion each day. If signs of tetany develop, as they do occasionally in very severe cases, calcium gluconate should be given. The urine should be watched daily for glycosuria, and insulin used as required.

Once the patient has fully recovered it is necessary to give thought to subsequent management. A protein-rich diet for the alcoholic and a reducing diet of low fat content

for the obese are likely to diminish the probability of further recurrences.

Elective cholecystectomy is indicated for those patients with proven gall-bladder disease, but not for those without demonstrable gall-bladder abnormality. Hypertension should be treated on its merits; if it is obviously progressive and associated with cardio-renal disease, then the use of hypotensive drugs is indicated.

Pancreatitis is a common disease in Australia, commoner than in Great Britain, where the two main ætiological factors, alcoholism and the type of metabolism causing the production of biliary calculi, are less prevalent. It is likely that more searching investigation of patients with obscure upper abdominal pain will bring to light an even greater number of cases.

SUMMARY AND CONCLUSIONS.

1. The clinical features of 33 cases of acute pancreatitis diagnosed between 1948 and 1954 at the Royal Perth Hospital, Western Australia, have been reviewed.

2. The unremitting quality and radiation of pain into the back should in most cases serve to distinguish pancreatitis from the majority of other medical and surgical emergencies. Jaundice and hæmatemesis can be misleading symptoms. In questionable cases, estimation of the serum amylase content converts diagnostic doubt into certainty.

3. Two-thirds of the patients had been having recurrent attacks of pancreatic pain, which had often been of extremely short duration and had accordingly been misinterpreted. The spectrum of pancreatitis is broad, including rapidly fatal pancreatitic necrosis at one extreme, and very transient upper abdominal pain causing no disability at the other.

4. If a diagnosis has been established, surgical exploration should be avoided, for there is evidence that the added shock of operation and the handling of tissues increase the risk of suppurative complications. In the more severe cases, the use of morphine or pethidine, atropine or "Banthine", antibiotics, continuous gastric aspiration and electrolyte replacement is a recommended practice.

5. Classification of pancreatitis into subgroups invokes the concept that the disease is a manifestation of systemic disorder in many cases. Two cases complicating gastrectomy are described. In six cases of alcoholism acute pancreatitis was the prelude to the chronic relapsing disorder. In the six cases in which biliary calculi were present, it was considered that the anatomical factor of reflux of bile into the pancreas could not be incriminated. It is postulated that the pancreatitis occurring in the obese, in diabetics and in patients of middle age (among whom females predominate) may owe its origin to disordered lipide metabolism and/or arteriolosclerosis.

6. This ætiological concept of pancreatitis is of importance in directing attention away from the technicalities of the surgical anatomy of the biliary tree towards metabolic or hæmodynamic considerations in both pathogenesis and management.

ACKNOWLEDGEMENTS.

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"BANTHINE" AND GASTRIC ACIDITY.

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THE publication by Longino *et alii* (1950) of the first report on the pharmacology of "Banthine" (β-methylaminoethyl xanthine-9-carboxylate methabromide) showed that this drug, a quaternary amine, diminished gastric motility to a considerable degree and also reduced gastric secretion. Both acidity and volume of secreted gastric juice were shown to be diminished by the oral administration of 100 milligrammes of "Banthine".

The present study on 14 patients with duodenal ulceration to whom 100 milligrammes of "Banthine" were given orally confirms the reduction of acid in gastric secretions.

This action has been shown to occur by a number of observers. Smith *et alii* (1950) showed that there was a considerable reduction in night secretion with "Banthine" given by mouth. Benjamin *et alii* (1950) also found a depression of basal gastric secretions. These investigators, by comparing the effects of "Banthine" and atropine, concluded that 1·2 milligrammes of atropine were equivalent to 10 milligrammes of "Banthine" in reducing gastric acidity. However, Atkinson (1954) summarized the work of other investigators and presented his own studies, which showed minor reductions of gastric acidity in five cases when the drug was given orally. He rightly pointed out that the method of sampling (continuous gastric suction or intermittent samples) would affect the results obtained.

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TABLE I.
Units of Free Acid With and Without "Banthine".

Case Number.	Time in Minutes.													
	0		20		40		60		80		100		120	
	C.[1]	B.[1]	C.	B.	C.	B.	C.	B.	C.	B.	C.	B.	C.	B.
I	76	0	75	8	76	17	78[2]	20[2]	70	17	0	13	20	0
II	46	15	76[2]	23	71	35[2]	0	28	43	20	42	15	46	5
III	20	22	26	23	53	24[2]	63[2]	20	31	17	23	16	24	10
IV	22	46	54	43	70[2]	67	55	68[2]	61	58	40	54	23	38
V	26	43[2]	55[2]	14	37	14	23	23	0	18	0	14	0	0
VI	40	0	15	43	55	26	52	23	55	23	70[2]	36	42	44[2]
VII	27	45[2]	32	12	64[2]	14	54	13	14	10	12	8	50	14
VIII	55	0	73[2]	0	63	0	62	0	69	0	54	0	69	15[2]
IX	34	0	48[2]	14	43	10	10	16[2]	0	15	0	15	0	14
X	0	15	0	20[2]	27[2]	18	23	20	14	14	0	18	0	17
XI	43	0[2]	24	0	26	0	31	0	49[2]	0	47	0	0	0
XII	0	25	5	25	42	25	72	38[2]	75	33	76[2]	37	32	28
XIII	16	0	7	11	31	11	46	13[2]	71	0	62	0	74[2]	0
XIV	25	10	32[2]	15	20	20	19	24[2]	21	16	15	15	5	8

[1] "C", control—no drug; "B", "Banthine", 100 milligrammes, given orally one hour before test.
[2] Maximum values of acid patient-wise.

The mechanism of this effect on gastric acidity has generally been conceded to be due to the atropine-like action of "Banthine".

Methods.

Fourteen patients with proven duodenal ulceration were tested. In each case two fractional test meal examinations were performed, one preceded by two tablets of "Banthine" (100 milligrammes) given orally one hour before, the other without any drug. In all cases the control test meal examination was made first. The test meal examination consisted of the usual preliminary complete aspiration of fasting juice, after a twelve-hour fast, and then the administration of 70 millilitres of 7% ethyl alcohol. Samples of gastric juice were aspirated at twenty-minute intervals through a Ryle tube for two hours, and free acid was measured by titration.

TABLE II.
Averages of Free Acid at Twenty-Minute Intervals, Alcohol Test Meals, with and without "Banthine" (Units).

Free Acid.	Fasting.	20	40	60	80	100	120
Without "Banthine"	30·7	37·3	48·4	42·0	36·0	31·5	28·0
With "Banthine", 100 milligrammes, given orally one hour before	17·0	17·2	20·1	20·5	17·2	17·2	13·8

Results.

Table I shows the readings obtained with and without "Banthine" in the 14 cases.

Table II and Figure I show the averages for free acid.

These results indicate that, under the circumstances of the experiment, "Banthine" causes a reduction of free acid. This is significant at the 5% level. They also show that the maximum acidity is significantly reduced by "Banthine" at the 1% level.

Discussion.

These results therefore show that gastric acidity is significantly lowered by "Banthine" when a series is tested. But there are a number of individual cases in which no reduction of acid is evident (Case X), while in others the effect of the drug is striking, producing achlorhydria (Cases VIII and XI). It must be remembered that a two-hour test of gastric acidity gives a glimpse only of the secretory conditions of the stomach. When "Banthine" is used therapeutically (as a rule in doses of 50 to 100 milli-

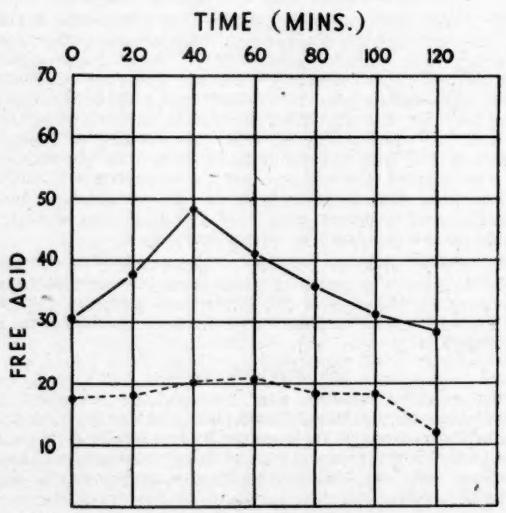

FIGURE I.
Composite curves of free acid. Continuous line, without "Banthine"; interrupted line, with "Banthine", 100 milligrammes given orally one hour before the test.

grammes, four times a day, half an hour before meals and on retiring), reinforcement of the demonstrable effects may be expected to occur. However, in a controlled experiment in which six-hourly oral administration of "Banthine" was reinforced by alkalis given six hourly, and in which the acidity of hourly samples was measured over a twenty-four hour period, Atkinson (1954) was able to show only a small reduction of acidity in five subjects with duodenal ulceration. A number of observers have shown its clinical effectiveness in large series (Grimson *et alii*, 1950; Winkelstein, 1952). We have not made controlled clinical studies, but our impression is that "Banthine" is an effective ancillary agent in reducing the pain of active duodenal ulceration. How its beneficial action is brought about is still uncertain, largely for the reason that there is no general agreement on the cause of pain in peptic ulceration. Palmer (1926) and Bonney and Pickering (1946) believe that acid acting on the ulcer is the important factor. Others (Hurst, 1911; Ryle, 1926) hold that changes in motility producing either spasm or abnormal waves are the main factors. Kinsella (1953) has recorded pathological evidence for his belief that acid cannot be a factor in producing pain because of the absence of demonstrable nerve endings in superficial layers of the crater. He believes that pain is due to compression of nerve fibres in the ulcer, the result of hyperæmia in the ulcer base, "the physiological hyperæmia of digestion, and the postural contraction or retraction of the wall of the stomach" (Kinsella, 1948).

Whatever may be the true explanation of pain in duodenal ulcer, "Banthine", and allied drugs which have a synaptic blocking effect, all reduce the motility of stomach and duodenum, and in the majority lower the acid content. It may well be that in either instance a definite though not complete physiological effect towards lower acid content and diminished motor activity may, for that individual, produce conditions in the stomach below the threshold of pain, whatever the cause of ulcer pain may be. In an analogous way, some sympathetic blocking agents may not produce much lowering of blood pressure in patients with hypertension, and yet symptoms are relieved, particularly headache. Here, too, measurement of the effect of the drug used is based on isolated observations of the blood pressure, and does not give the full picture of pressure acting on arteries over the whole day and night. A small, discontinuous, but long-acting reduction of physiological activity may lower the threshold below that which produces symptoms in hypertension as in duodenal ulcer.

Summary.

"Banthine" (100 milligrammes by mouth) given one hour before an alcohol test meal, when controlled by test meal examinations without drugs in the same patients, has been shown to lower significantly the free acid level in a series of 14 patients with duodenal ulceration.

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INDUCTION OF LABOUR.

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IT is proposed to discuss the subject of induction of labour under the headings of methods, indications and results.

A series of figures is given from The Women's Hospital, Crown Street, Sydney, embracing the years 1950–1951 and 1952–1953, July to June in each case. To constitute a representative cross-section of work at that hospital the years were not taken consecutively. In these periods, 9255 viable infants were born at the hospital.

Reduced to its simplest form, the problem is that of medical induction *versus* surgical induction, and the latter is really the question of artificial rupture of the membranes, for no other method of surgical induction was used during that time, nor will it be considered. Consequently, to obtain accurate figures, all cases of artificial rupture of the membranes during the period were studied in detail, and gave much more constant findings than vaguely recorded medical inductions with doubtful time of onset of true labour pains.

Medical Induction.

When it is decided that a patient should have labour induced, medical induction is usually attempted first. This is by a more or less routine method, although there are individual variations.

Oleum ricini and an enema are given in all cases. Stilbœstrol is often exhibited the day before the induction in doses of 20 milligrammes or more every four hours to sensitize the uterus. Large intramuscular injections of "Œstroform" are occasionally used, but one has the impression that they are not of much use except perhaps in the presence of a dead fœtus. Quinine is rarely used, and then only in minimal doses of 2·5 grains.

In a survey carried out by myself some years ago, the conclusion was reached that quinine caused fœtal distress and even intrauterine fœtal death in an appreciable percentage of cases.

"Pitocin" is generally given by the injection of three minims for five doses at half-hourly intervals, the first injection often being subdivided to test the patient for sensitivity. "Pitocin" was given by the drip method in only three cases.

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In the series of cases of artificial rupture of the membranes to be considered, many of the patients had previously had medical inductions of labour which failed. This was so in 44% of the *multiparæ* and 45% of the *primigravidæ*.

Medical induction is also commonly employed to augment the onset of labour after artificial rupture of the membranes. In our series, this was used in 57% of the *multiparæ* and 58% of the *primigravidæ*.

An average time of twelve hours elapsed between rupture of the membranes and the commencement of the medical induction.

In the case of accidental hæmorrhage, the question of giving "Pitocin" arises, as the uterine wall may be weakened where it is ploughed up by the effusion of blood. Certainly "Pitocin" must be given with care; but it is thought that, if the uterus were to rupture with the "Pitocin", it would certainly rupture with the strain of labour.

Artificial Rupture of the Membranes.

Artificial rupture of the membranes in this series was carried out in 321 cases.

As there was a total of 9255 births during this time, artificial rupture of the membranes represents 3·4% of all cases.

There were 3082 *primigravidæ* (with an incidence of artificial rupture of the membranes of 3·35%) and 6173 *multiparæ* (with an incidence of artificial rupture of the membranes of 3·45%). This is a small series, but highly selective. In order not to confuse the results, cases have been excluded in which there was any suggestion of labour pains in the history, any abdominal pain or backache, or a cervix which was dilated sufficiently to admit three fingers.

Artificial rupture of the membranes was as a routine preceded by "stripping of the membranes", and it was found that this manœuvre helped to prevent the blockage of the Drew-Smythe catheter with mucus and blood clot.

A so-called ripe cervix is certainly an advantage when the procedure is being carried out, but was not invariably present. This end, devoutly to be wished, is assisted by a previous medical induction, and in some cases when it was not present the patient was returned to the ward and the medical induction was repeated prior to another attempt at artificial rupture of the membranes.

It was found that engagement of the head was especially important in *primiparæ* for favourable results; but again this was not invariably present. An anæsthetic is not given to our patients except in the case of very severe preeclampsia; but self-administered "Trilene" is usually offered to them if they so desire.

In some instances, when the Drew-Smythe catheter is being used, pure blood is returned down the lumen. It is our practice to withdraw the catheter and not persist with the artificial rupture of the membranes. These cases have, of course, been excluded from this series of figures.

The membranes were ruptured by the "low" method (by the use of a Howard Kelly forceps *et cetera*) or by the "high" method (by the use of the Drew-Smythe catheter). Both methods have their advocates, and a comparison is made between them.

Possibly the high rupture is safer from the point of view of infection, if Cæsarean section is to follow, and undoubtedly it may be useful in hydramnios; but Tables I and II show conclusively that a low rupture is more efficient. In the case of a breech presentation or floating head, high rupture should be performed.

Because it is so difficult to assess the actual time of onset of labour pains, it was thought that more accurate figures would be obtained if the time was taken from the artificial rupture of the membranes to the conclusion of the third stage of labour. In our series, this has been done in all cases.

Parity.

Table I shows the results for *primigravidæ*, and these are all true *primigravidæ*, no so-called "virtual *primiparæ*" being included, as it was considered that a previous miscarriage might influence the cervix and the results.

Table II sets out the results for *multigravidæ*.

Table I.

Primigravidæ.

Type of Rupture of Membranes.	Average Amount of Liquor. (Ounces.)	Average Time from Artificial Rupture of Membranes to End of Third Stage. (Hours.)
Low, 27 cases	13·8	18
High, 79 cases	18·5	42
Total, 106 cases	17·3	35·9

Both these tables emphasize the advantage of "low" over "high" rupture of the membranes.

More liquor was withdrawn from the "high" than the "low" rupture.

It has been stated in text-books that the quantity of liquor withdrawn influences the onset of labour. In our series this was not so, and the amount of liquor made no significant difference. In most cases liquor continues to

Table II.

Multigravidæ.

Type of Rupture of Membranes.	Average Amount of Liquor. (Ounces.)	Average Time from Artificial Rupture of Membranes to End of Third Stage. (Hours.)
Low, 54 cases	14·5	18·8
High, 161 cases	28·6	57·25
Total, 215 cases	20·5	35·6

escape long after the measured quantity has been withdrawn, so perhaps this conclusion is not surprising. Comparison of Tables I and II demonstrates the unexpected fact that *primigravidæ* react better than *multigravidæ* to artificial rupture of the membranes. The average time which elapsed for the former was 35·9 hours, as against 35·6 hours for the latter; but it must be recalled that the much longer *primigravida* labour is included in this time lapse.

Table III demonstrates the effect of parity upon artificial rupture of the membranes, and the surprising conclusion emerges that the average time (from artificial rupture of the membranes to the end of the third stage) lengthens with parity up to seven, after which the small number of cases probably lose their statistical significance. This is of great clinical importance, as one has rather been in the habit of considering artificial rupture of the membranes to be undertaken much more lightly in a woman who has already undergone several successful labours.

In the case of multiple pregnancy, it is suggested that a low rupture is safer, as there may be some doubt as to which amniotic sac is being drained.

Long Time Lapse.—Perhaps the greatest worry that besets the *accoucheur* after he has ruptured the membranes is the patient who does not come into labour reasonably quickly. Despite penicillin and sulphonamide "cover", which is commenced after a twenty-four hour lapse, an

uncomfortable query arises as to what to do next. If induction is fairly urgent, Cæsarean section must be considered. In our series 11 patients had ruptured membranes from seven to nineteen days. They all had repeated medical inductions. One of these cases resulted in a neonatal death from uterine infection after Cæsarean section, and one in a stillborn hydrocephalic fœtus. Perhaps it is a comforting thought that in all the other long time lapse cases the mother and baby survived. There were no "trial labours" in the series, as we count this a contraindication to artificial rupture of the membranes. If a small pelvis and a toxæmia which needs termination coexist, medical induction may be tried; but if it fails, Cæsarean section must again be the method of choice.

TABLE III.

Parity.	Number of Cases.	Average Amount of Liquor. (Ounces.)	Average Time from Artificial Rupture of Membranes to End of Third Stage. (Hours.)
0	10	12·6	23·8
1	69	20·0	20·7
2	52	17·4	28·7
3	31	26·8	45·6
4	23	20·3	54·8
5	12	28·0	43·4
6	10	24·5	47·0
7	4	16·5	104·0
8	—	—	—
9	1	18·0	137·0
10	1	1·0	36·0 (Cæsarean section)
11	1	20·0	23·0
14	1	10·0	23·0
All *multiparæ*, total ..	215	20·5	35·6

Indications.

It is our policy to interfere only when absolutely necessary during the course of a pregnancy and labour.

The figures taken from a teaching hospital must differ, of course, from those obtained in private practice.

TABLE IV.

Indications for Artificial Rupture of Membranes.

Indication.	Number of Cases.
Preeclamptic toxæmia	253
Rh-negative mother with agglutinins ..	20
Ante-partum hæmorrhage	14
Diabetes mellitus	8
Cardiac disease	5
Pyelitis	5
Chronic nephritis	5
Hydramnios	4
Post-maturity	3
Hæmaturia	1
Acute bronchitis	1
Epilepsy	1
Hysteria	1

A large number of answers to an American *questionnaire* in 1939 showed that induction of labour was carried out at term or for the convenience of the patient or the obstetrician to the surprising extent of 43%; but such an indication is rarely taken into account in a large public hospital. Table IV shows the indications in our series, and it is only to be expected that preeclamptic toxæmia (which includes cases of essential hypertension) is far the most common.

Postmaturity is a very real problem. The fœtal risk is due to placental insufficiency, and this may be increased by induction of labour; but nevertheless it is considered wise to interfere when a patient has exceeded her estimated date of confinement by two weeks.

Whether or not there is such a condition as a postmature fœtus, it has been rightly stated that there is definitely a postmature placenta.

This subject is of great interest from a medico-legal angle, and the maximum duration of pregnancy in some countries is defined by law at 300 days (Scotland, France, Italy, Austria, Germany, Switzerland); but England and the United States of America decide each case on its individual merits, as is the practice of our courts in Australia. H. L. Stewart, junior, reported a series of cases with basal temperatures as an indication of ovulation time and the onset of pregnancy. The average duration of pregnancy was 266 to 270 days, and in no case did pregnancy exceed 285 days from the day of ovulation, although in some it continued for 300 days or longer from the first day of the last menstruation. If all the data are accurate, it would look as if longer durations of pregnancy are due to late ovulation.

In Rh-negative women with agglutinins, labour is usually induced at thirty-five to thirty-six weeks, more especially if there is a history of previous erythroblastosis.

Diabetes mellitus constitutes an almost constant indication for induction at about the thirty-fifth week.

Results.

In this series of 321 cases of artificial rupture of the membranes there was no maternal death. There were 14 stillbirths or neonatal deaths, but this figure included three which were inevitable, with anencephalic and hydrocephalic infants and hydrops. The corrected fœtal mortality was thus 3·4%.

In only one case could the neonatal death be blamed directly on the artificial rupture of the membranes. This patient had severe preeclampsia, and after a nine days' latent period following the rupture of the membranes Cæsarean section was performed. *Pseudomonas pyocyanea* was grown on culture from the liquor, and the baby died with a pneumonic infection in two days.

Period of Gestation.

No significant figures were obtained which favoured induction of labour closer to term. In 25 of our cases the period of gestation was between twenty-eight and thirty-five weeks, and the latent period *plus* the labour averaged thirty-one hours. This compares with the average in all cases of 39·7 hours.

Prolapse of the Cord.

Prolapse of the cord is often cited as a danger after artificial rupture of the membranes, but did not occur in this series. Possibly the method employed has something to do with this, as an assistant always holds the fœtal head into the pelvis while the membranes are being ruptured.

Cæsarean Section.

Cæsarean section was performed after artificial rupture of the membranes in six cases. The results of these are shown in Table V. Penicillin and sulphonamide cover was given in each case after twenty-four hours of ruptured membranes, and there was no undue morbidity in the convalescent periods.

Rh-Negative Mothers with Agglutinins.

Twenty Rh-negative mothers with agglutinins had their membranes ruptured, and there were two babies lost (one after Cæsarean section).

Ante-partum Hæmorrhage.

Fourteen patients underwent artificial rupture of the membranes, and there were four stillbirths.

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Diabetes Mellitus.

Artificial rupture of the membranes was performed eight times on mothers suffering from *diabetes mellitus*, and all the babies survived.

Cardiac Disease, Nephritis, Pyelitis.

In cardiac disease, chronic nephritis and pyelitis labour was induced by artificial rupture of the membranes in 15 cases, and in all resulted in a live baby.

TABLE V.

Cæsarean Sections Performed After Artificial Rupture of Membranes.

Indication.	Latent Period.	Result.
1. Rh-negative mother with agglutinins.	54 hours.	Erythroblastosis (baby died after blood transfusion).
2. Rh-negative mother with agglutinins.	100 hours.	Live baby.
3. Rh-negative mother with agglutinins.	28 hours.	Live baby.
4. Severe preeclampsia ..	9 days, 21 hours.	Baby died in two days. (*Pseudomonas pyocyanea* grown on culture from liquor).
5. Severe preeclampsia ..	97 hours.	Live baby (nine years' sterility).
6. Eclampsia (emergency admission).	36 hours.	Baby died.

Summary.

1. Three hundred and twenty-one cases of artificial rupture of the membranes are presented. This method of treatment was adopted for 3·4% of patients delivered of a viable fœtus at The Women's Hospital, Crown Street, Sydney, during the two years under review.

2. The latent period between the rupture of the membranes and the termination of the delivery is discussed, and it is seen to be shorter when a low rupture is performed. Surprisingly, multiparity did not improve the efficiency of the method.

3. Indications and results are tabulated and demonstrate the safety of this method of inducing labour for the mother and child, with no maternal death and a fœtal mortality rate of 3·4%.

Acknowledgement.

My thanks are due to Dr. G. K. Bernays, of The Women's Hospital, for his help in the compilation of the figures.

AGING IN THE AUSTRALIAN POPULATION.

By H. O. LANCASTER,

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CHANGES in the age distribution of the Australian population have been evident in the censuses of 1933 and 1947. Similar changes, referred to briefly as aging, have been noted in many other countries such as England and Wales, and indeed generally throughout north-western Europe. From time to time quite erroneous views are expressed on the causation and the implications of this aging. Therefore it is proposed briefly to discuss the medical, social and economic problems involved in changes in the age distribution of the Australian population.

At the outset, we meet the difficulty that demographic factors rarely stay constant sufficiently long for their long-term implications to be fully realized. Thus, in order to study the effects of certain fertility and mortality patterns, some ideal populations, the life-table populations, must be considered. These life-table populations serve as norms with which actual populations may be compared. The age-distributions of actual populations are of great interest from many points of view, for the old are in greatest need of medical and social care, the young need schools, and so on. Indeed, the great problem is whether aging leads to economic and social burdens intolerably heavy for the productive age groups of the population. We shall see later that unnecessarily gloomy views are widely held on this problem.

We shall analyse the dependency burden into components which can be considered separately, such as those due to age, illness, orphanhood and so on. Finally, some of the economic, social and medical implications of changes in mortality and fertility of the Australian population will be discussed.

LIFE-TABLE POPULATIONS.

The following description of the theory of the life-table population follows the simple account of Dublin, Lotka and Spiegelman (1949) and the more sophisticated account of Lotka (1925).

It may be supposed that a life-table has been given, such as that derived from the mortality prevailing in Australia most conveniently taken in the year of a census, 1947 for example. We may consider the populations resulting from births occurring in some determined number per year. The simplest case is when a constant number of births occur each year, giving rise to a stationary life-table population. On the other hand, the births may occur according to some fixed law, such as when the births increase or decrease each year in geometric progression, giving rise to a population of fixed age distribution but variable size known as the stable life-table population. The stable life-table population arises naturally in any population if the birth-rates and death-rates at every age remain constant for an indefinite length of time.

The Stationary Life-Table Population.

The data for a stationary life-table population are (i) a constant number of births *per annum*, B, and (ii) a life table.

In life-table notation, the number of survivals to age x from l_0 entering at birth is l_x, so that the chance of survival to age x is given by l_x/l_0. In life tables, l_x is usually given only for completed years of life, but values for fractional years of life are readily obtained by graduation, so that the curve given by $y=l_x$ can always be drawn.

Suppose that calendar time is represented by t years measured from some origin, and that the age of an individual is represented by x. In a small unit of time, dt, there are born Bdt. B is the number of births per unit of time. After a lapse of x years, the survivors from this number of births will be this quantity multiplied by a factor, the probability of surviving to that age, namely l_x/l_0. So that after t years the number of persons between the ages x and $x+dx$ will be the survivors to age x from the Bdx births x years previously—that is, at time $(t-x)$. The number aged between x and $x+dx$ at time t is then Bl_xdx/l_0. Now if t is large, greater than the greatest possible life span, then the survivors at every age can be computed and hence the total population. The total population will be the sum of the infinitesimal parts, so that:

P, the total population, is given by

$$P=\int_0^\infty Bl_x/l_0dx. \qquad \ldots\ldots\ldots (1)$$

Let L_x be the number of persons at age x years last birthday in the population; then

$$L_x=\int_x^{x+1} Bl_x/l_0dx \qquad \ldots\ldots\ldots\ldots\ldots (2)$$

or $L_x=\frac{1}{2}B(l_x+l_{x+1})/l_0$, approximately. $\ldots\ldots$ (3)

The justification for formula (3) is that the decrease in l_x is practically linear over a short period such as a year at most ages. In graphical terms, the curve of l_x can be represented satisfactorily for this purpose by a series of straight lines joining the points (x, l_x) to $(x+1, l_{x+1})$, and so the area under the curve $y=l_x$, between the points x and $(x+1)$, can be represented by a trapezium with base one unit and sides of height l_x and l_{x+1}, as in Figure I, in which it is clear that the area under the curve $y=l_x$ is very close to the area of the trapezium, especially as the curvature has been deliberately exaggerated in the figure and the height of the trapezium truncated for purposes of graphical convenience. The total population will thus be:

$$P=\sum_{x=0}^{x=\infty} L_x=\int_0^{\infty} Bl_x/l_0\,dx$$

$$=\tfrac{1}{2}B\sum_{x=0}^{x=\infty}(l_x+l_{x+1})/l_0$$

$$=B\left(\tfrac{1}{2}l_0+\sum_{x=1}^{x=\infty} l_x\right)/l_0. \qquad \ldots\ldots\ldots (4)$$

By appropriate choice of B, the total population can be made equal to any convenient number, for example one million. In the life-table population, so defined, the size and age distribution are both constant. This population is referred to as the "stationary life-table population". The approximation used in formulæ (3) and (4) is highly accurate except in the first year of life and at very high ages, where the mortality rates are high; but it suffices for practical purposes even in these age groups. In the first year of life the use of the approximation

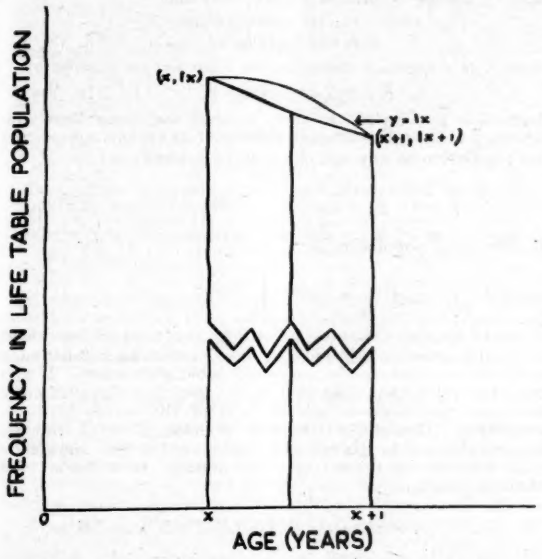

FIGURE I.

formula is equivalent to the assumption that the death rate in the first year of life is slightly higher than the mortality rates given. At higher ages there are few persons alive, and the absolute error due to the approximation is quite small. I have used the simple approximation for all the life-table populations of Table I. An alternative procedure is to construct a special life-table for the first year of life and use the approximate formula with the month as the unit of time. With the more modern experience of infant mortality, this is a quite unnecessary refinement.

In Table I are given stationary life-table populations computed from the official life tables for Australia based on the mortality experience for the three periods 1881 to 1890, 1932 to 1934 and 1946 to 1948. In Figure II the age distributions of two stationary life-table populations are displayed in the form of a "population pyramid". The life-table populations have been computed so that the total for either sex is one million. When the populations for the three periods are compared, a decrease in the proportion at the younger ages in the later life-table populations is to be noted, but the effect is not a very striking one. There is a compensatory increase in the numbers at the higher ages in the later periods. This effect is again not striking except at the very high ages, when the proportionate difference is considerable. This may be summarized by noting that a set of rates of mortality more favourable at every age will result in an "older" stationary life-table population.

So far no detailed mention has been made of sex. Life-table populations have been constructed for each sex; but it is desirable to have life-table populations of the two sexes combined. The total births, B, may therefore be considered to be of two parts, B_m and B_f, male and female births.

$$B=B_m+B_f. \qquad \ldots\ldots\ldots (5)$$

The males and females may be subjected to the appropriate mortality rates throughout life. It is possible to make such an adjustment quite simply, and I have done so and give the results in Table III in the form of factors to be used. The two factors

TABLE I.

Life Table Populations Constructed from Australian Census Data.

Age. (Years.)	1881–1890. Life-Table Populations.		1933. Life-Table Populations.		1947. Life-Table Populations.	
	Males.	Females.	Males.	Females.	Males.	Females.
0 to 4 ..	90,123	85,212	74,897	70,879	73,203	68,954
5 to 9 ..	85,130	80,876	73,634	70,536	72,492	68,436
10 to 14 ..	83,882	79,796	73,161	70,191	72,205	68,252
15 to 19 ..	82,355	78,610	72,624	69,801	71,810	68,047
20 to 24 ..	79,620	76,664	71,867	69,194	71,240	67,747
25 to 29 ..	76,338	74,084	70,983	68,379	70,643	67,314
30 to 34 ..	73,069	71,118	70,027	67,437	69,998	66,766
35 to 39 ..	69,691	67,993	68,846	66,321	69,204	66,069
40 to 44 ..	65,893	64,571	67,300	65,002	68,066	65,149
45 to 49 ..	61,412	60,915	65,167	63,352	66,254	63,847
50 to 54 ..	56,021	56,815	62,145	61,094	63,360	61,904
55 to 59 ..	49,591	51,943	57,792	58,096	58,960	59,191
60 to 64 ..	42,235	46,135	51,821	54,034	52,721	55,369
65 to 69 ..	33,660	38,733	44,018	48,139	44,358	49,835
70 to 74 ..	24,346	29,843	34,237	39,911	34,147	41,778
75 to 79 ..	15,321	20,396	23,159	29,348	22,814	31,099
80 to 84 ..	7,644	10,916	12,301	17,717	12,376	18,912
85 to 89 ..	2,845	4,145	4,630	7,913	4,831	8,458
90 to 94 ..	712	1,055	1,196	2,299	1,167	2,463
95 to 99 ..	106	168	187	345	144	385
100 and over	6	12	8	12	7	25
Total	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000

add up to unity. If the population of males at an age is multiplied by the factor and added to the corresponding population of females, then the number for the total population of persons is obtained. It is important to use the factors if, for example, the masculinity in the life-table population is being considered.

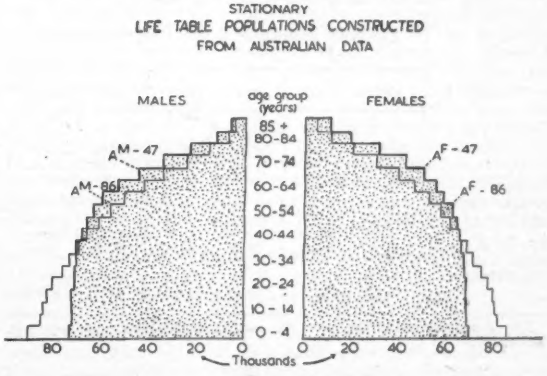

FIGURE II.

Some Properties of the Stationary Life-Table Populations.

The stationary life-table populations form an important norm in population analysis, and so their properties are now considered in some detail.

The Age Distribution of the Stationary Population.—The age distributions by sex are set out in Table I. In the later life tables such as the 1933 Australian or the 1947 Australian, the distribution of ages is almost rectangular up to the age of sixty years; that is, there are practically equal numbers in the different age-groups, so that, for example, there are almost as many persons aged fifty to fifty-four years as there are persons aged five to nine years.

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The Average Age of the Stationary Populations.—From Table I the average ages in the populations may readily be computed. They are compared in Table III with the average age in the enumerated populations at the time of the census, either at the end of the period from which the mortality rates for the life table were computed as in 1891, or at the mid-point of this period as in 1933 and 1947. The median age has also risen in the stationary life-table population. The modal age group is necessarily the youngest in the stationary population.

TABLE II.

The Life-Table Population of One Million Persons: The Structure of the Life-Table Populations of Persons, by Sex and by Broad Age Groupings, Constructed from the Mortality Rates in Australia in the Years Mentioned.

Age. (Years.)	1881 to 1890.		1932 to 1934.		1946 to 1948.	
	Males.	Females.	Males.	Females.	Males.	Females.
0 to 19 ..	168,524	164,359	146,755	141,090	143,869	137,777
20 to 64 ..	283,200	288,829	292,171	287,239	293,210	288,631
65 and over	41,769	53,319	59,704	73,041	59,514	76,999
Total	493,493	506,507	498,630	501,370	496,593	503,407

The Average Age at Death in the Stationary Population.—The average age at death in the stationary life-table population is the same as the expectation of life at birth, $\mathring{e}_0$.

The Death Rate in the Stationary Population.—The death rate in the life-table population is the reciprocal of the expectation of life, for since each person will live on an average $\mathring{e}_0$ years and will die once, he will on an average contribute $\mathring{e}_0$ to the number of years lived and unity to the number of deaths, so that death rate is $1/\mathring{e}_0$ per person. This figure must be multiplied by a factor such as a million to bring it into line with the usual terminology for mortality rates, which are often given as rates per million *per annum*.

The Modal Age at Death.—The modal age at death is the same as in the life table, and has been given in the previous paper (Lancaster, 1951c).

TABLE III.

Some Features of the Stationary Life-Table Population.

Age.	Life-Table Populations Founded on the Mortality in Australia in the Years					
	1881 to 1890.		1932 to 1934.		1946 to 1948.	
	Males.	Females.	Males.	Females.	Males.	Females.
Average age of the living ..	32·6[1] (25·4)	34·0 (22·5)	35·9 (30·5)	37·4 (30·6)	36·2 (32·2)	38·0 (33·0)
Mean age at death	47·2	50·8	63·5	67·1	66·1	70·6
Median age of the living ..	30·2[1] (21·7)	31·7 (18·4)	34·4 (27·6)	36·2 (27·8)	35·0 (30·4)	36·9 (31·0)

[1] The corresponding values for the actual populations are shown in parentheses.

The Uses of the Stationary Life-Table Population.

The stationary life-table population serves as a norm in all population work. Thus it may be used as a standard population as I have done in the series on Australian mortality. This was a common practice of William Farr. Some special interest attaches if the rates on which the life table was founded are applied to the same life-table population. We then find, as in a previous paragraph, that the life-table death rate is the reciprocal of the expectation of life at birth; this standardized death rate has been dignified by the name of the "true" death rate by some authors. It is of interest to apply the death rates from a specific disease, such as cancer, to the life-table population and so determine the proportion of all deaths in the life-table population that are due to the particular cause. Examples of this use may be found in Farr (1875), Dublin, Lotka and Spiegelman (1949) and Lancaster (1951*b* and 1952*a*).

It is necessary now to consider the case in which the number of births *per annum* is not constant, but is increasing at a regular rate, so that there is a straight-line (or linear) relationship between the logarithm of the births and the time.

The Stable Life-Table Population.

Suppose that $B(t)$, the births *per annum* at time t years, is equal to the number at the original year, $B(0)$ multiplied by a factor $\exp(rt)$, so that

$$B(t)=B(0)\exp(rt). \quad \ldots\ldots\ldots (6)$$

(The symbol $\exp(rt)$ means here base e of the Napierian logarithms raised to the power rt.) Then, if the probability of survival to each age is known, the age distribution is determined. For at time t, let the frequency of persons between ages x and $x+dx$ be $P_x dx$. Then $P_x dx$ are the survivors at time t of births x years previously. The probability of survival to age x is l_x/l_0, so that

$$P_x dx=B(t-x)l_x/l_0 dx. \quad \ldots\ldots\ldots (7)$$

Then, by the use of formula (6), it follows that

$$\begin{aligned} P_x dx &= \exp r(t-x)B(0)l_x/l_0 dx \\ &= K\exp(-rx)l_x dx \quad \ldots\ldots\ldots (8) \end{aligned}$$

where K is a constant depending on t but not on x given by

$$K=B(0)\exp(rt)/l_0. \quad \ldots\ldots\ldots (9)$$

The stable population, in fact, receives its name from the constancy of the ratios between the size of its various age groups. The population at any age can now be determined:

$$L'_x=\int_x^{x+1} P_x dx \quad \ldots\ldots\ldots (10)$$

and the total population is

$$P=\sum_{x=0}^{\infty} L'_x dx=\int_0^{\infty} P_x dx. \quad \ldots\ldots\ldots (11)$$

By use of an appropriate value for $B(0)$, it can be arranged that the total population P is equal to some convenient number such as a million. This is the stable life-table population. If r is given the value zero, then it is easily seen that the stationary population is merely a special form of the stable life-table population. The stable life-table population is of interest theoretically, for as Sharpe and Lotka (1911) first showed, a fixed schedule of death rates and fertility rates leads to a stable population.

Some Properties of the Stable Life-Table Populations.

If the births are given by $B(0)\exp(rt)$ as in the preceding section, then the population increase can be shown to be $100r\%$ when the population attains the stable form. If r is positive, the stable population is increasing, if r is negative it is a decreasing one, and if r is zero, the stable population is actually a stationary population. Values of r could range from $0{\cdot}01$ to $-0{\cdot}01$ without any dramatic change in the fertility rates in Australia. In Figure III are given the population pyramids of two stable populations, both constructed from the same mortality data, the 1947 Australian life tables. In one population r is $+0{\cdot}01$, in the other r is $-0{\cdot}01$. These may be compared with Figure II, in which the stationary life-table population ($r=0$) for the 1947 Australian mortality experience is given.

It is evident that the age structures of the three 1947 populations differ more among themselves than do the stationary populations, which are founded on different mortality experiences. Positive values of r give rise to young stable populations, as can be seen from the form of the population with $r=+0{\cdot}01$. On the other hand, negative values of r give rise to old populations. With $r=-0{\cdot}01$, the most frequent age is seen from Figure III to be just over fifty years. The population pyramid is undermined, and such a population evidently would be on the way to extinction. In fact, it would be decreasing by 1% *per annum*. Of course, changes in mortality could not cause any such effect in the stationary populations, since by its definition the number present at any age is proportional to l_x and l_x, the number surviving from a group of l_0 births must be decreasing as x increases.

We might work out the properties of a stable population, but such results would be true only for a given value of r, so that we shall make only a few general statements. When r is positive, the mean and median ages in the stable population are lower; the modal age is the first year of life; the mortality rates

averaged over the whole population tend to be lower, since the elderly are poorly represented. When r is negative, the mean and median ages are higher; the modal age will be usually not the first year and will be higher with increasing absolute value of r; for example, the modal age will be higher when $r=-0{\cdot}01$ than when $r=-0{\cdot}005$; the mortality averaged out over the whole population will be higher, since the elderly will be heavily represented.

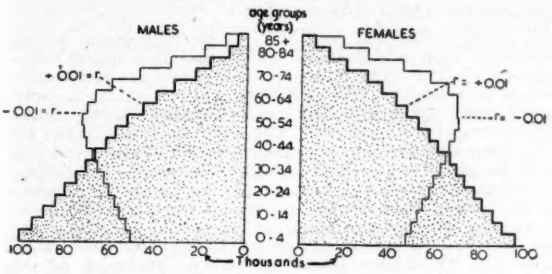

FIGURE III.

Two stable life-table populations constructed from the mortality rates existing in Australia in 1946 to 1948. In one, the births are increasing by 1% every year, that is, r = 0·01; in the other, decreasing by 1% every year, that is, r = −0·01.

It is evident that moderate departures from the fertility rates just sufficient to maintain a stationary population can cause very profound changes in the age distribution of a population if continued over a long period of time.

THE TRUE RATE OF NATURAL INCREASE.

It was formerly believed that in the absence of migration, population changes could be adequately measured by the difference between births and deaths, a view that is reflected in the preoccupation of Pearl (1927) over many years with the study of the logistic curve of the total population and with the "vital index". However, changes in age distribution are also of importance. Thus it has been shown many times that a population may be increasing in numbers at a time when its pattern of fertility and mortality imply its ultimate extinction. For example, England and Wales had unduly low fertility rates before the second World War, which, if continued indefinitely, would have led to a decline of about 20% per generation, and yet the total population was increasing. Attempts have been made by Lotka, Fisher (1930) and numerous other demographers to obtain measures of growth independent of the current age structure of the population. Such a measure was the net reproduction rate first used by R. Boeckh in 1886 and made popular (1928) by Kuczynski; the intrinsic rate of increase of Lotka corresponds to the r introduced in the preceding section. A discussion of these indices has been given by the Royal Commission (1949).

The net reproduction rate measures the average number of female children born to a female in a group passing through life at a prescribed set of rates of fertility and mortality.

Suppose now that l_0 females begin life, l_x survive to age x years, and that there are born an average of $f(x)$ female children at age x to each woman. Then there will be $l_x f(x)$ female births to women aged x years. The total number of births to the l_0 women can be written, if R_0 is the mean number of female births to each woman,

$$l_0 R_0 = \sum_0^\infty l_x f(x) \quad \ldots\ldots\ldots\ldots\ldots\ldots (12)$$

or better as an integral

$$l_0 R_0 = \int_0^\infty l_x f(x) dx \quad \ldots\ldots\ldots\ldots\ldots (13)$$

$$R_0 = \int_0^\infty l_x f(x) dx / l_0. \quad \ldots\ldots\ldots (14)$$

If R_0 is greater than unity, each female in one generation will be represented in the next by more than one female. The population will tend to increase—indeed, successive generations will increase in a ratio R_0. With R_0 less than unity, the population would tend to decline. An R_0 of unity would lead to a population constant in size.

It was first shown by Sharpe and Lotka (1911) that, given a fixed schedule of mortality and fertility rates, the population would assume a stable form, whereby the number of persons aged x would be proportional to $l_x \exp(-rx)$, where $\exp(-rx)$ is the base of the Napierian logarithms raised to the power $(-rx)$; r has been called the true or intrinsic rate of natural increase, since the whole population would have a size proportional to $\exp rt$, where t is the time from any origin; $100r$, in fact, is the annual percentage rate of increase and corresponds closely to the rate of interest in accountancy.

It may be shown that r is approximately the root of an equation

$$(R_2/R_0 - R_1^2/R_0^2)r^2 - 2rR_1/R_0 + 2\log_e R_0 = 0 \quad \ldots (15)$$

where R_0 is as defined above in (14).

$$R_i = \int_0^\infty x^i f(x) l_x dx / l_0, \text{ for } i=1 \text{ or } 2. \quad \ldots\ldots (16)$$

In statistical language the coefficients of r^2 and $2r$ are the second and first moments of the distribution of the births by age of mother. A full discussion of these equations is given in the Royal Commission report (1949), or in the paper by Glass and Blacker (1938).

If r is small, then formula (15) may be further simplified to

$$r = R_0 \log_e R_0 / R_1 \quad \ldots\ldots\ldots\ldots (17)$$

R_1/R_0 as defined by formula (16) is practically the length of a generation—that is, the mean age of mothers giving birth to a daughter.

AGE DISTRIBUTION OF THE AUSTRALIAN POPULATION.

As was pointed out in an earlier paper (Lancaster and Willcocks, 1950), the growth of the Australian population was very rapid up to the time of the first World War. The chief factors operative before 1900 were high birth and immigration rates. After 1900 the death rates fell, especially in the early years of life. During the period between the two World Wars the birth rates fell and net immigration was low and sometimes even "negative". Further changes occurred in mortality, but reductions were still principally at the lower ages. Since the second World War, birth rates have risen, immigration has been high and further reductions in mortality have occurred. During the years of this century, these demographic factors have been reflected in the age distribution of the Australian population. It is common to ascribe all these changes to changes in mortality. Our analysis in the preceding sections should lead to doubt on this conclusion. The study of the life-table populations suggests that changes in the birth rate might well be more powerful than changes in mortality, and indeed this was known to William Farr (1875). Further, in 1933 there were noted to be less children at ages nil to four years than at ages five to nine years. This cannot be explained by changes in mortality, but is readily accounted for by changes in the birth rate. But the critical observation is that changes in mortality have occurred chiefly at the younger ages (Lancaster, 1951*a*), and have been such as to retard the aging—in fact, they have acted in the same way as would an increase in the birth rate. Let us imagine the population pyramid for Australia in, say, 1947, reconstructed so as to allow only as many in the different age groups as would have survived had the mortality rates of, say, 1900 persisted. Since reductions in mortality have occurred chiefly at the younger ages, it would be only the younger age groups, up to, say, the age of fifty years in 1947, that would be affected. The survivors in each would be less than those actually enumerated in 1947. The reconstructed population would show definite undermining, especially for the age groups up to age thirty-five years in 1947. Such an analysis would clearly show that mortality changes in the past have been such as to delay the aging of the population. Migration changes have contributed less definitely to the change in age distribution. There is no doubt that the high immigration rates assisted in keeping the population young in years past. But now that the total population of Australia is larger, migration is relatively less important than it was.

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We may conclude this section by noting that changes in birth rates have been the great cause of aging in the Australian population. Migration formerly was of assistance in keeping the population young, but is of less importance now. Mortality has actually acted in a direction contrary to the one usually stated, for reductions in mortality have delayed the aging process.

Problems of Aging.

We have now to consider some of the social, demographic and medical aspects of the aging problem. First of all we notice that, although the populations of England, the United States of America and many other countries have been aging for many years, only recently has much interest been shown in the problems implied. This is to be related to changes in attitude to the aged. It is now realized that in an industrial society the members cannot all prepare adequately for their old age. In a more settled rural state of society, tradition would give the aged certain privileges and natural assistance from their social group, family, clan or tribe. But in an industrial civilization, with the breakdown of the older order, it is inevitable that the State would be called in. The State usually gives assistance by means of old age pensions. It is thus seen that the ratio of the productive to the dependent is of great importance. In most discussions the dependency is restricted to the aged, and since this type of dependency is increasing, a note of pessimism enters. We must therefore discuss other types of dependency as well. Dependency is of at least six types: (i) the aged; (ii) the young; (iii) married women, not wage-earners; (iv) widows; (v) orphans; (vi) invalids. Of these types, we shall not consider (iii) and (iv) in detail. Under modern economic and social conditions, widowhood is not a great cause of dependency unless the widow is also aged or the mother of children. Thus we may confine our attention to the aged, the children, orphans and invalids.

Age Dependency.

The Commonwealth Statistician divides the population into six classes by age. We may pool some of his classes to form three—namely, a childhood class up to the end of the fifteenth year, a productive class from fifteen up to the end of the sixty-fifth year, and finally an old age class of sixty-five years and over. So modified, the Commonwealth Statistician's figures are given in Table IV. Striking changes are evident in the

Table IV.

The Population of Australia in Natural Age Groups: Percentage Distribution at Censuses of 1881 to 1947.

Age Last Birthday. (Years.)	1881.	1891.	1901.	1911.	1921.	1933.	1947.
Males.							
0 to 14 ..	34·20	32·92	31·81	28·95	29·80	25·75	24·07
15 to 64 ..	62·96	63·89	63·88	66·71	65·73	67·88	68·50
65 and over ..	2·84	3·19	4·31	4·34	4·47	6·38	7·43
Females.							
0 to 14 ..	39·38	37·25	34·25	30·53	29·94	25·66	23·27
15 to 64 ..	58·51	60·22	62·15	65·27	65·68	67·76	68·06
65 and over ..	2·11	2·53	3·60	4·20	4·38	6·58	8·67

classes of the aged. A gradual increase for males from 2·84% in 1881 to 4·47% in 1921 is followed by a rapid rise to 6·38% in 1933 and then a more gradual rise from 1933 to 1947. Similar changes have occurred in the class of aged females. Migration has had an effect in causing the males to be relatively more heavily represented in the earlier censuses at the higher ages. In recent years the females have had more favourable mortality at practically all ages and have not had to bear the burden of the war mortality.

The changes in the percentage of aged in the population have been small compared with those at childhood. In 1881 more than a third of each sex were aged less than fifteen years. In 1947 less than a quarter were of these ages.

As a result, the productive ages in 1947 formed a larger proportion of the population than ever before, and so the age dependency was actually less than ever before. Yet considerable apprehension is often expressed, for the aged now form over 8% of the total population. The explanation is, of course, that children are almost entirely dependent on their parents, whereas the aged may be a burden on the State and hence are of greater interest to the tax-payer and administrator.

We can now take a more balanced view of aging. Any population which is aging tends to be doing so because the birth rates are low. Dependency thus increases at the old ages and diminishes at the young. Further, much of the fall in mortality has been brought about by the same social forces as has caused the aging; for example, the mortality from infectious disease has fallen, partly because of changes in family size according to Lancaster (1953) and Burnet (1952).

It appears that the proportion of the population at the productive ages is remarkably stable, and that unless extraordinary changes occur in births or there is some catastrophic change in mortality, this proportion will not change rapidly. It was especially noted by the Royal Commission (1949) that in England rapid increases in the birth rate would not change the ratio of the total dependants to the productive classes favourably until perhaps fifty years had elapsed. There seems little reason for pessimism about the ratios of the age groups in Australia at the present time if economic factors alone are considered. It appears also that an underlying fear is that the nation may not have enough men of the critical military age groups—say sixteen to thirty-nine years. A detailed discussion of this problem will be found in Notestein (1942) but need not detain us further here.

Dependency due to Orphanhood.

A more cheerful note can be struck in discussing the incidence of orphanhood, which will be less with more favourable mortality rates. We may distinguish paternal, maternal and complete orphanhood. It is convenient to follow the method of Lotka (1931) and of Dublin, Lotka and Spiegelman (1949) in estimating the orphanhood in a population. Lotka's method consists of noting that we may without great error consider all children as having been born of fathers of the same age and of mothers of the same age. Of course, owing to the increase in mortality rates with age, a child born to an old father will be more likely to become an orphan than a child born to a young father; but Lotka showed that the chances average out in such a way that their mean may be computed as if the age of the parents was fixed. The mean parental age at the time of conception has been taken to be thirty years for the father and twenty-seven years for the mother. From the appropriate life table, the probability that the father will die before the birth of the child, before its first birthday and so on may be computed. Similar computations may be carried out for the maternal orphanhood. For Australian data the rates of orphanhood are given in Table V. A very great reduction in the rates of orphanhood is evident. For example, of children born in the years 1891 to 1900, about 1% would be born paternal orphans, about 10% would be so at their tenth birthday and about 20% at their eighteenth birthday. According to the 1947 experience, only about 0·2% would be paternal orphans at their birth, about 2·6% at age ten years and 7% at age eighteen years, which represents a great improvement. Table V implies that about 3% of the stationary population in 1881 to 1890 would be paternal orphans and about 2·7% maternal orphans. About 0·7% of the 1947 stationary population would be paternal orphans under the age of eighteen years, and about 0·6% maternal orphans. The total orphanhood in the population is somewhat less than the sum of the maternal and paternal orphanhood, for complete orphans will be enumerated twice if the two are summed. For the total orphanhood the complete orphans must be subtracted. The probability of complete orphanhood is somewhat greater than the product of the paternal and maternal orphanhood probabilities.

Invalid Dependency.

Comparatively little factual information is available for Australia under the heading of invalid dependency. There has been no survey comparable with the American survey on chronic disease (National Health Survey, 1936) or the information made available from the National Health Insurance in England. Dublin (1941) cites the National Health Survey and gives a graph showing invalidity rates of 1%, 1·6%, 2·8%, 5·3%, 7·3% and 11·4% at ages forty, fifty, sixty, seventy, eighty and ninety years respectively. It is usually believed that modern

advances in medicine may be increasing this invalidity rate. This fear arises from a misconception of how and at what ages the improvements have occurred. It cannot be too much stressed that practically all the improvements have taken place at the younger ages. In the past much was made of the effect of a high infant and child mortality in weeding out the unfit. But this line of argument can be pushed too far; for example, the change of the age distribution of tuberculosis was formerly ascribed to loss of immunizing infections in childhood. However, it is now generally believed (for example, Springett, 1952, following the work of Derrick, 1927, Andvord, 1930, and Frost, 1939) that analysis by the generation method shows that a favourable mortality experience in youth is followed by a favourable experience throughout life. There seems good reason for believing that the fall in tuberculosis death rates is being accompanied by a fall in morbidity and invalidity rates.

TABLE V.

The Percentage of Orphaned Children at Successive Ages.

Age of Child. (Years.)	1891-1900 Experience.		1947 Experience.	
	Paternal Orphans.	Maternal Orphans.	Paternal Orphans.	Maternal Orphans.
0	0·9	0·8	0·2	—
1	1·7	1·6	0·4	0·3
2	2·6	2·4	0·6	0·5
3	3·5	3·2	0·8	0·6
4	4·4	4·0	1·0	0·8
5	5·3	4·8	1·2	1·0
6	6·2	5·6	1·5	1·2
7	7·1	6·4	1·7	1·4
8	8·1	7·3	2·0	1·6
9	9·1	8·1	2·3	1·8
10	10·1	9·0	2·6	2·0
11	11·2	9·9	3·0	2·3
12	12·3	10·9	3·4	2·5
13	13·4	11·8	3·8	2·8
14	14·6	12·7	4·3	3·1
15	15·8	13·7	4·8	3·4
16	17·1	14·6	5·4	3·8
17	18·4	15·6	6·1	4·1
18	19·7	16·6	6·8	4·5

There seems good reason also for believing that the great changes in the incidence of the infective diseases of childhood will lead to lessened morbidity and invalidity; thus there will be less bronchiectasis due to measles and whooping-cough and less chronic bronchitis; there will be less nephritis following scarlatina. With the great fall in incidence of the bowel diseases, children may be expected to grow up less susceptible to other infections. Modern treatment of syphilis and gonorrhœa may also be expected to lessen invalidity. In Australia there is little need to reckon on favourable effects on morbidity at higher ages from treatment at younger ages for such diseases as malaria or schistosomiasis. I mention them merely to show that it is by no means axiomatic that successful therapy results in an invalid population, as is so often maintained. Other gains that may be noted result from the improved treatment of accidents—burns and scalds and the like—and the special accidents and diseases of child-bearing.

When we come to diseases of old age, it is well known that modern therapy has had little effect, with the notable exceptions of diabetes and pernicious anæmia. It is possible that in these two diseases effective therapy increases the active period of life and decreases the period of invalidity once so inevitable as the disease progressed.

The Aged.

It is possible that many of the more pessimistic views on the problem of aging emanate from those working in teaching hospitals. Sheldon (1948), working on a random sample in Wolverhampton, England, noted the importance of taking a true random sample of the population. Otherwise biased views might result, for "the degree of self-selection imposed by the population on itself in regard to its approach to doctors inevitably gives anything other than a random sample a considerable bias".

We may end this section by noting the extensive work done under the Nuffield Foundation by Sheldon (1948) and by a committee (Seebohm Rowntree, 1947). In Northern Ireland also work has been carried out by Adams and Cheeseman (1951). More general problems of age have been considered by Adams and others in a symposium arranged by the British Association (Adams, 1953).

Economic aspects of the problem are beyond the scope of the present paper, but have been discussed by Pollard (1952) in a rather pessimistic review of aging in Australia. It may be mentioned that the actuarial problem of each generation providing for its own old age would be quite easy if it were not for the inflationary effects of wars. Depressions are of less importance.

SUMMARY.

Aging of the Australian population has been considered. It has been necessary to set up stationary and stable life-table populations to show that small changes in fertility can cause very great changes in age distribution, and to support the argument that a diminished rate of population growth (that is, low birth and immigration rates) has been chiefly responsible for the aging of the Australian population. Mortality changes have hitherto actually retarded the aging, as they have occurred at the younger ages.

The problem of aging is often considered from the point of view of dependency, so that an analysis is made of some other forms of dependency—the young, the married females not wage-earners, widows, orphans and invalids. It appears that the young and the aged together form a rather stable fraction of the population. Recent mortality reductions lead to greatly lessened orphanhood and widowhood. Reasons are given for believing that a far too pessimistic view is taken of the aging problem.

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Reports of Cases.

LYMPHOGRANULOMA VENEREUM: A REPORT OF A CASE WITH THE ISOLATION OF THE VIRUS.

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As the name implies, *lymphogranuloma venereum* (LGV) is a disease usually transmitted by venereal contact. It is caused by a virus which is similar to that producing psittacosis. The disease, which is considered to have world-wide distribution, is known by a variety of names, some of which are *lymphogranuloma inguinale*, climatic bubo, venereal bubo, sixth venereal disease, Durand-Nicholas-Favre disease, poradenitis and *lymphopathia venereum*. Because of unsatisfactory means for correct diagnosis, an accurate record of prevalence is not available (Meyer, 1952). The venereal origin of the disease was not recognized until 1912, and in 1913 Durand, Nicholas and Favre collected the varied manifestations of scrofulous buboes under one entity which they designated "subacute inguinal lymphogranulomatosis". Meyer (1952) states that they erroneously believed that its close resemblance to Hodgkin's disease permitted the designation *lymphogranuloma inguinale*. The virus origin of the disease was first established by Levaditi *et alii* (1932) and Findlay (1933). Elementary bodies, similar to those of psittacosis, were first recognized by Findlay and his co-workers (1938). The pathogenicity of the virus for mice, chick embryos and monkeys led to the development of improved skin test antigens and complement-fixing antigens (Rake *et alii*, 1940; Bedson *et alii*, 1949).

The isolation in Australia of the LGV virus does not appear hitherto to have been recorded, and to date laboratory diagnosis has been on histological appearances and the Frei test, the antigen for which has been available only from overseas sources (Frei, 1925).

Clinical Record.

The patient was a Pakistan seaman, aged twenty-two years, whose most recent sexual intercourse had been with a native woman in Ceylon five weeks previously. He complained of a painful swelling in his right groin, which had been present for three weeks. He had not noticed a penile lesion or urethral discharge. (The history was obtained with difficulty through an interpreter.) On examination of the patient there was no sign of a penile lesion. Several right inguinal lymph glands were moderately enlarged, tender and discrete. The patient was observed without treatment for five days, by the end of which time one of the lymph glands was very swollen and fluctuant. Serum was collected for laboratory examination. The patient reacted positively to the Frei test (Lederle antigen). Under local anæsthesia pus was aspirated from the gland and submitted for laboratory investigation. A course of aureomycin was given for six days, after which pus was still draining from the aspiration site and the inguinal lymph glands were still enlarged. At this stage the patient rejoined his ship and was not seen again.

Laboratory Investigations.

Examination of direct smears of the aspirated pus revealed numerous pus cells and a few red cells. Inclusion bodies and bacteria were not detected. Attempts at aerobic and anaerobic cultures gave negative results. The pus was examined by the virus diagnostic laboratory at the Prince Henry Hospital for the presence of LGV, which was suspected of being present in spite of the failure to demonstrate inclusion or elementary bodies in the direct smear. A suspension of the pus in sterile broth was cleared by centrifugation at 3000 revolutions per minute for ten minutes at 0° C. Intracerebral and intraperitoneal inoculations of the supernatant fluid were made into suckling mice and into six weeks old mice. The same suspension was used for the yolk-sac inoculation of five days old chick embryos. In spite of blind passages no infective agent could be demonstrated in eggs, in suckling mice or in the intraperitoneally inoculated six weeks old mice. On the other hand, all the intracerebrally inoculated adult mice became ill after five days. Their fur became ruffled, some were excitable, and others developed slight tremors. Two of eight mice died on the seventh day, and impressions were made from their brains, as well as from the brains of those that were ill. Impressions stained by Machiavello's method[1] showed the presence of elementary bodies and inclusions characteristic of the psittacosis-lymphogranuloma group of viruses. Ten brain-to-brain passages in adult mice have been carried out since February, 1951. During this manipulation the agent has not increased in virulence for mice, and some slight difficulty has been experienced in maintaining it. After the first three passages mice rarely died, but often developed (seven to twelve days after inoculation) slight muscular incoordination, ruffled fur and occasional weakness; a few were excitable.

Serological Reactions.

Complement-fixing antigens were prepared from infected mouse brains. In order to prevent non-specific fixation of complement with the antigens, it was necessary to carry out the following partial purification. Suspensions (10%) of infected brains were made by grinding them with sand in normal saline. The suspensions were frozen and thawed twice and then cleared by centrifugation at 3000 revolutions per minute for twenty minutes. The supernatant fluid was then frozen and thawed six times and the preparation cleared by centrifugation at 5500 revolutions per minute for twenty minutes. The supernatant fluid was diluted 1:2 with normal saline and stored at −23° C. until required. A germicide was not added.

The serum from the patient from whom the virus was isolated fixed complement specifically in the presence of the LGV antigen, but not in the presence of normal suckling mouse brain antigen. The results with a psittacosis antigen prepared from infected allantoic fluid, normal allantoic fluid, LGV mouse brain antigen and normal mouse brain antigen are recorded in Table I.

Discussion.

The diagnosis of *lymphogranuloma venereum* infections in Australia has, in the past, been made on clinical grounds with very little support from laboratory examinations. This communication is of interest because the clinical diagnosis was confirmed by the following: (i) the isolation of a virus identified as LGV; (ii) the demonstration of complement-fixing antibodies in the patient's serum; (iii) a positive response to the Frei test.

Once the virus had been isolated by mouse inoculation, it became important to differentiate it from the psittacosis virus to which it is antigenically related. This differentiation was made on the following observations: (i) its

[1] Machiavello's stain: 0·25% basic carbol fuchsin in phosphate buffer (pH 7·4), five minutes; 0·5% citric acid, two seconds; wash; 1% aqueous methylene blue, eleven seconds; wash and dry.

TABLE I.

Results of Complement Fixation Tests with Sera from Two Patients (One with Psittacosis, the Other with Lymphogranuloma Venereum Infection).

Serum From.	Antigen.	Reciprocal of Serum Dilutions.[1]				
		20	40	80	160	320
Patient with psittacosis.	Saline	−	−	−	−	−
	Normal allantoic fluid[2]	−	−	−	−	−
	Psittacosis allantoic fluid	++++	++++	+++	−	−
	Normal suckling mouse brains	−	−	−	−	−
	Psittacosis suckling mouse brains	++++	++++	+	−	−
Patient with *lymphogranuloma venereum* infection.	Saline	−	−	−	−	−
	Normal allantoic fluid	−	−	−	−	−
	Psittacosis allantoic fluid	++++	++++	++++	++++	++
	Normal mouse brains	−	−	−	−	−
	Lymphogranuloma venereum mouse brains	++++	++++	++++	++	−

[1] "++++", no lysis; "−", 100% lysis.

[2] Allantoic fluid diluted one-half in normal saline and containing 0·5% phenol.

inability to produce an apparent infection in suckling mice (Dorman *et alii*, 1954); (ii) its pathogenicity for adult mice by the intracerebral route only (Meyer, 1952); (iii) its decreasing virulence in adult mice on passage (Findlay, 1938); (iv) its isolation from pus from a patient clinically diagnosed as suffering from LGV.

It is interesting to note that Findlay (1938) transmitted 26 strains to mice, only two of which were highly virulent; the other strains lost their infectivity on passage. Our findings with the Sydney LGV strain support those of Findlay, but differ from those obtained with local strains of psittacosis virus, which do not lose their virulence for mice on passage.

Summary.

The isolation and properties of a strain of LGV have been described. The complement fixation test, the Frei test and virus isolation were used to support the clinical diagnosis of LGV. It is suggested that a complement-fixation test with a LGV mouse brain antigen is likely to be of value in aiding diagnosis. The strain of LGV isolated may be used for the preparation of a Frei antigen.

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Reviews.

Applied Cytology. By G. R. Osborn, M.B., B.S. (Melbourne); 1953. London: Butterworth and Company (Publishers), Limited. Sydney: Butterworth and Company (Australia), Limited. 10″ × 7″, pp. 180, with 131 illustrations. Price: 49s. 6d.

THIS book deals with the technique and the criteria adopted for the cytological diagnosis of cancer of the uterus, bronchus, breast and bladder. The main part of the book is devoted to the first of these, in which the author has had fairly extensive experience. He states that his book is based on five years' work on the correlation of cytology and histology and their application as routine laboratory procedures; the greater part of this work was in the field of gynæcology. He emphasizes the importance of the collection of material and describes this procedure meticulously. "The clinician's part is absolutely vital." Papanicolaou's technique is described and illustrated. While deprecating exaggerated claims for the importance of cytodiagnosis and the description of "unconvincing fine points, giving cytology a mystical atmosphere", Osborn believes that cytology has a useful place, when used as complementary to histology. Three-quarters of this book is devoted to the description and illustration of the cytology and histology of the female genital tract in health and disease. Each chapter is illustrated by full-page photomicrographs of cytological and histological preparations, including a series of "pitfalls in diagnosis". The remainder of the book deals briefly with the cytology of the sputum, of fluid from mammary cysts, of the urine and of pleural and ascitic fluid. Throughout the book the photomicrographs are well selected and very well reproduced. This work should provide a useful introduction to the study of cytology.

Clinical Interpretation of Laboratory Tests. By Raymond H. Goodale, M.D.; Third Edition; 1954. Philadelphia: F. A. Davis Company. Sydney: Angus and Robertson, Limited. 9″ × 6¼″, pp. 738, with 105 illustrations, six in colour. Price: 80s. 9d.

IN the review of the second edition of this work it was stated that the author had not attained his object of providing a guide to the interpretation of laboratory tests and to the choice of the most helpful laboratory procedures. The present edition includes various additions and alterations, but still falls short of that object. As in previous editions, the book endeavours to cover too great a territory and to serve the needs of too many people. In the preface the hope is expressed that ". . . medical students, interns and medical technologists as well as clinicians, should find it a valuable reference work. . . ." The time is long past when a single text could serve the needs of all these people, and in the attempt to serve the needs of all the book becomes no more than a pocket encyclopædia which could not be recommended for any of them.

Findlay's Recent Advances in Chemotherapy. By F. C. O. Valentine, F.R.C.P., and R. A. Shooter, M.A., M.D.; Third Edition; 1954. Volume III: Antibiotics. London: J. and A. Churchill, Limited. 8″ × 5¼″, pp. 300, with seven illustrations. Price: 27s. 6d.

IT is always a pleasure to open a volume in the "Recent Advances" series, and this smallish book is no exception to the rule. The authors have completed the work begun by the late G. M. Findlay, and have set it out constructively and clearly. They remark in the preface that information on this subject more than others is liable to be out of date by the time it is through the press, but reading of the pages shows that they have enumerated principles which will stand the test of time, and which should be printed in letters of gold for the clinician to paste in his hat. Whether treatment is really necessary, whether the lesion is one which can be treated by drugs alone or by surgery under drug cover, whether the causative microorganisms are sensitive and likely to remain so, are vital questions. The answers are seldom clear in the mind of the person who uses arti-

biotics most frequently, and these aspects are discussed in detail before separate bacterial infections are considered.

The staphylococci pose more problems in treatment than most organisms, and the rise of resistance, a phenomenon well established and observed since 1944, when Kirby first recorded the production of penicillinase, is discussed as a biological phenomenon as well as a clinical problem, and the authors face the fact that the answer does not lie in bigger and better antibiotics.

There is no purpose to be served here in enumerating the diseases discussed by the authors—the range is wide and details of amounts and methods of administration of antibiotics are discussed in a way that the clinician will find useful. The medical student, too, will find the book packed with that elusive substance known as "good oil", which is an essential metabolite at examination time.

Methods of Examination in Ear, Nose and Throat. By W. G. Scott-Brown, C.V.O., M.D., B.Ch., F.R.C.S.; 1954. London: Butterworth and Company (Publishers), Limited. Sydney: Butterworth and Company (Australia), Limited. 8¼" x 6", pp. 118, with 94 illustrations. Price: 28s.

THE author's "excuse for this short book" is to provide "a practical guide to the most efficient way of examining this region". It was prompted by two considerations: first, the number of failures in qualifying and higher examinations, arising directly from faulty methods used by candidates in the practical parts of the examination, and secondly, the daily necessity for general practitioners to examine the ear, nose or throat.

The result is a compact synopsis which combines straightforward clinical methods with a host of practical hints and inferences. The text is liberally illustrated and lucidly presents all accepted methods of examination, as well as standard X-ray positions and other special tests and their interpretation.

Not the least of its advantages is its value to those concerned with teaching the practical minutiæ of examining this region. Some may quibble about technical points, such as digital examination of the post-nasal space by palpation through the soft palate in children, or the method of holding the tongue for indirect laryngoscopy. It is open to doubt whether such procedures as the use of the nasopharyngoscope, pneumophone, speech audiometer, stroboscope, and galvanic and optokinetic labyrinthine tests will have much application in general practice, nor can one visualize the general practitioner setting up a full examination table as depicted. These minor criticisms do not detract from the general excellence of this well-produced book.

Illustrated Review of Fracture Treatment. By Frederick Lee Liebolt, A.B., M.D., Sc.D., LL.D.; First Edition; 1954. Los Altos, California: Lange Medical Publications. 10" x 7", pp. 240, with 605 illustrations. Price: $4.00.

AN illustrated review of fractures is a new departure in this sphere. The book consists of a generous collection of figures and X-ray photographs, illustrating the tersely worded text describing the ætiology, incidence, pathology, clinical findings, treatment and prognosis of every fracture in the body. Necessarily brief, such a synopsis cannot replace a text-book and can serve only as a supplement. Although in many ways incomplete, it nevertheless serves its purpose in this limited respect. However, one feels that anyone studying or practising the treatment of fractures will require a more detailed knowledge of the subject than a synopsis can provide.

A Handbook of Operative Surgery: Surgical Urology. By R. H. Flocks, M.D., and David Culp, M.D.; 1954. Chicago: The Year Book Publishers, Incorporated. 8¾" x 6", pp. 392, with 118 illustrations. Price: $9.75.

THIS book is intended to bring together "the more important anatomic, physiologic and surgical principles involved in operative urology", especially for "the resident urologist, the practising urologist and the teacher of urology". It is a most unusual work, both in the selection of material and in the method of presentation. Diagnosis, general management and pre-operative and post-operative treatment are entirely omitted and technical details are cut to an absolute minimum. Nevertheless, space is given to a rather sketchy outline of the anatomy and physiology of each organ, while principles are dealt with in more detail. The format is that of a tablet volume, the letterpress being very brief but supplemented by numerous line drawings which, being very well arranged, illustrate the text on the opposite page. The standard achieved by these means seems inadequate to be of value to specialists. A more suitable field for this book would be the teaching of broad principles of operations for undergraduates.

The Year Book of Dermatology and Syphilology (1953-1954 Year Book Series). Edited by Marion B. Sulzberger, M.D., and Rudolf L. Baer, M.D.; 1954. Chicago: The Year Book Publishers, Incorporated. 8" x 5¼", pp. 456, with 54 illustrations. Price: $6.00.

THIS particular Year Book is always designed to appeal to a much wider field than the specialists in dermatology, and the present volume opens with a long special article by the editors entitled "Some Advances in Dermatologic Management: A Guide for the General Practitioner". The abstracts have been selected from a range of literature that the editors state is too large to be covered completely. They have tried to make a fair and representative selection and have sought by brief editorial comment to place the articles in perspective. The material in the lengthy opening chapter on treatment and prevention is grouped under the headings of endocrine therapy, physical therapy and other therapy. Then follow chapters on eczematous dermatitis, on atopic dermatitis, urticaria and allergy, on drug eruptions, on miscellaneous dermatoses, on cancers, precanceroses and other tumours, on fungous infections, on other infections and infestations, on venereal diseases and their treatment (exclusive of gonorrhœa), on investigative studies and on miscellaneous topics. There is much of interest here for the dermatologist, the physician, the general practitioner and others.

Books Received.

[The mention of a book in this column does not imply that no review will appear in a subsequent issue.]

"Social Science in Medicine", by Leo W. Simmons and Harold G. Wolff; 1954. New York: Russell Sage Foundation. 9¼" x 6", pp. 254. Price: $3.50.

Addressed primarily to students in medicine and social sciences, but also to "public spirited citizens".

"Advances in Internal Medicine", edited by William Dock, M.D., and I. Snapper, M.D.; 1954. Chicago: The Year Book Publishers, Incorporated. Volume VI. 9" x 6", pp. 376, with 100 illustrations. Price: $10.00.

Deals with ten different subjects.

"Anesthesia in General Practice", by Stuart C. Cullen, M.D.; Fourth Edition; 1954. Chicago: The Year Book Publishers, Incorporated. 8" x 5¼", pp. 312, with 37 illustrations. Price: $5.00.

One of the series of "General Practice Manuals".

"The Practice of Refraction", by Stewart Duke-Elder, K.C.V.O., M.A., D.Sc., Ph.D., LL.D., M.D., D.M., F.R.C.S., F.A.C.S.; Sixth Edition; 1954. London: J. and A. Churchill, Limited. 8" x 5½", pp. 348, with 239 illustrations. Price: 21s.

The first edition was published in 1928.

"Twenty-Five Years: The Story of the Royal College of Obstetricians and Gynæcologists, 1929-1954", by William Fletcher Shaw, M.D., F.R.C.P., F.R.C.O.G., Hon. LL.D.; 1954. London: J. and A. Churchill, Limited. 8¼" x 5¼", pp. 100, with 12 illustrations. Price: 21s.

The author has been associated with the College from its foundation.

"The Anatomy of the Eye and Orbit: Including the Central Connections, Development, and Comparative Anatomy of the Visual Apparatus", by Eugene Wolff, M.B., B.S. (London), F.R.C.S. (England); Fourth Edition; 1954. London: H. K. Lewis and Company, Limited. 10" x 7½", pp. 500, with 406 illustrations, 52 in colour. Price: 63s.

Intended for the student and the ophthalmic surgeon.

"The Medical Clinics of North America"; 1954. Philadelphia and London: W. B. Saunders Company. Melbourne: W. Ramsay (Surgical), Limited. New York Number. 9" x 6", pp. 314, with 31 illustrations. Price: £6 per annum in paper binding and £7 5s. per annum in cloth binding.

Consists of a symposium on the differential diagnosis of internal disease—19 chapters by 31 contributors.

The Medical Journal of Australia

SATURDAY, OCTOBER 2, 1954.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given: surname of author, initials of author, year, full title of article, name of journal, volume, number of first page of the article. The abbreviations used for the titles of journals are those adopted by the Quarterly Cumulative Index Medicus. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction are invited to seek the advice of the Editor.

THE FAMILY AS BASIC UNIT OF SOCIETY.

It has long been accepted as axiomatic that the family is the fundamental unit of social life. Its welfare has been employed as an unchallengeable criterion in assessing the possible operation of any suggested new procedure or change of any established one. Television, hours of sale of liquor, a decline of sabbatical dedication to spiritual thought and ritual, cost of living, easy divorce, birth control, living in flats, communal meals and many other actions and innovations, actual or hypothetical, are judged primarily by their possible influence on family life. Just as the physicist is able to proclaim with confidence the impossibility of any project if it can be shown to lead to a perpetual motion machine, so a declaration of antagonism to family life is put forward as a convincing argument against any tendency or policy which might be regarded in this light. All will concede that when, as was common three generations ago, a married couple regarded it as normal to possess ten to twelve surviving children, a very great influence for good developed amongst the brothers and sisters; loyalty, comradeship, tolerance, and self-sacrifice came into being spontaneously; the older children protected the younger and were regarded by these with some measure of hero-worship. But with the decline in the size of the family there came, *pari passu*, a decline in these noble qualities, and it may be said with assurance that when only one child graces the home such attributes not only sink to the zero point but may actually be registered as negative.

Even when family influence is at its highest level one serious deficiency is demonstrated by the necessity of the school. From ancient times and in all civilized communities the school has been found an essential requirement as it gives the child something in education which the home cannot provide. The boy or girl starts life with a definite handicap if education is obtained within the home, even when tutor or governess is imported. The wonder is that John Stuart Mill, educated exclusively by his father, should have turned out as sane as he was; but all biographers admit that he attained to his highest peak of usefulness when he freed himself from paternal direction. Not only are the trained teachers operative, but even more so the contacts, criticisms, banter and competition of fellow pupils are of incalculable service in "knocking the corners off". It is said that when Mrs. Shelley, widow of the poet, was choosing a school for her boys, the principal rather sententiously remarked that his great aim was to make his pupils think for themselves. Mrs. Shelley pathetically replied: "Could you just make them think like other people?" She had had her experience of wayward originality which Eton, strange to relate, had not quelled. In many cases the function of the school is not only to give something which the home cannot, something complementary and supplementary, but actually to counteract the home. One may say therefore that the smaller the family, the greater is the necessity for the school, and yet one never hears prophecies of disaster if school influence is liable to be weakened through any impinging agent.

We now come to the role played by the parents in the development of character and reason. We have travelled far from the stern papa of Victorian times, but there is a risk of the reaction going too far. One reads often, especially in American literature, of fathers and sons being called "pals". It will be observed that this claim always emanates from the father and not from the son, who lives for a great part of the waking day in a world from which his parents are excluded. Not until the son marries and has a family of his own can true intimacy of father and son arise. As regards the mother there will be general consent that in early childhood mother's love is irreplaceable. It is in the biographies of many illustrious men that we find how much was ascribed to early maternal influence. There is, however, a grave danger that the mother will bestow on her children of mid-teen age the same tutelage she exercised when they were younger. Somerset Maugham declared that the greatest calamity which could befall a boy was to have an affectionate mother; had he said over-affectionate or a mother who persisted in treating her son as if he were three years younger than he was we should certainly agree with him. This blindness to growth of the child in reason and acceptance of responsibility is the besetting sin of parents and is the main cause of the "adolescent revolt" which gives so much pain to both father and mother. Samuel Butler in his notebooks wrote: "I believe that more unhappiness comes from this course than any other—I mean from the attempt to prolong family connection unduly and to make people hang together artificially who would never naturally do so." It will be remembered that the same author in his book "The Way of All Flesh" humorously and paradoxically describes a young man in severe illness thinking of how he treated his parents—he came to the conclusion he had been far too good to them! The really important role which parents can carry out in the development of their children is in

setting examples of truthfulness, honesty, tolerance, cleanliness, refinement in speech and action, kindliness and other obvious virtues. If they are religious, then their practice must faithfully follow their professions, for no more observant critics can be found than the young people of the home. In conclusion therefore let us assess the value of the home, not as it was, but as it is now; let us avoid exaggeration as well as ungenerous depreciation, and in using the family as a test for the estimation of the moral value of any measure let us remember that there are other factors equally important.

Current Comment.

THE PRE-OPERATIVE PREPARATION OF THE LARGE BOWEL.

It is valuable at times to pause and to review critically any methods which have become "routine", a word which has been defined as a habit more or less adequately rationalized. The pre-operative care of the large bowel is a matter for which most surgeons have developed their own routine, more or less adequately based on established principles and more or less effective. H. E. Lockhart Mummery's[1] recent review of both the principles and practice is well worthy of consideration, more particularly as still further advances in the techniques and scope of colonic surgery may well be expected to follow more efficient methods.

From the point of view of the patient's general condition there is little of specific importance. Severe anæmia or protein deficiency may necessitate a longer period of preparation than the usual five to seven days. Added vitamins are usually given by mouth; these are perhaps better given parenterally, despite the fact that inhibition of biosynthesis by antibiotics given orally probably does not contribute significantly to any deficiency. The "mechanical" preparation of the large bowel, necessary to relieve colonic distension and fæcal loading, is effected by aperients and by washouts. Lockhart Mummery advises one-half to one ounce of paraffin to be taken twice daily combined with an aperient, and discontinued forty-eight hours before operation. Castor oil (half an ounce) then ensures emptying of both the small and large bowel. Diarrhœa, which diminishes the effectiveness of antiseptics given orally, must be avoided. In this way no oily fæces remain which might be difficult to remove with the final bowel washout twelve hours before operation. The number and frequency of thorough bowel washouts are related to the degree of obstruction, varying from one before operation to one daily or one on alternate days for a week or two. Obviously, in more severe obstruction the question of a preliminary transverse colostomy arises.

Oral chemotherapy is, of course, the major advance in management, and the problem is now one of appropriate selection of drug and of the duration of administration. This does not imply that any one drug possesses all the required properties (for example, uniform effectiveness over a wide range of normal flora, prevention of the development of resistant strains, activity when given orally in the presence of a normal diet and normal digestive processes), but rather that due allowance must be made for the shortcomings of any particular drug. Dismissing sulphaguanidine because of its unreliability, Lockhart Mummery indicates his preference for sulphathaladine over sulphasuxidine. More strongly bacteriostatic, this compound does not produce the semifluid stools found with sulphasuxidine; it is, however, rendered ineffective by concomitant oral or parenteral administration of penicillin. Allergic side effects are very rare, and there is no loss of effect even if administration is continued for some weeks.

Unlike these sulphonamides, streptomycin eliminates Gram-positive cocci as well as coliform organisms, although it is not fully effective in regard to Proteus and anaerobes. Its action is maximal within thirty-six hours, as after this time resistant strains emerge in profusion, even when it is used in combination with sulphathaladine. Since these strains may lead to post-operative infections unresponsive to streptomycin, there is a case for complete omission of this drug. The practice at Saint Mark's Hospital is an appropriate compromise in that it is given only for the forty-eight hours immediately prior to operation. "Aureomycin" and "Terramycin" possess the all too familiar disadvantage of producing nausea, diarrhœa and pruritus; furthermore, they are also absorbed when given by mouth, and thus add the possibility of undesirable systemic effects. Of the newer antibiotics, neomycin, according to the American literature, appeared to be the most promising. It inhibits the growth of all normal intestinal flora (except occasionally *Aerobacter aerogenes*, which is sensitive to sulphathaladine) within twenty-four hours, and resistant strains do not emerge even after several weeks of therapy. Absorption and hence systemic reaction are negligible. As with "Aureomycin" and "Terramycin", overgrowth of yeasts occurs, but evidence of their pathogenicity is lacking. The daily dose is 100 milligrammes per kilogram of body weight in divided four-hourly doses. Its efficiency and speed are such that forty-five minutes after the injection, at operation, of a 1% solution through the bowel wall the contents are found to be sterile, a fact which may be of far-reaching importance in regard to emergency abdominal surgery.

Lockhart Mummery concludes the introduction to his paper with what may be a truism for both surgeon and epicure, but which will perhaps bear repetition: "A well-prepared bowel is no excuse for any relaxation of meticulous operative technique."

[1] *Postgraduate M. J.*, April, 1954, page 192.

EFFECT OF TEA ON GASTRIC SECRETIONS AND MOTILITY.

Tea is one of the most popular drinks, and while there are many opinions as to the effect of tea on the stomach, little research has been done on it. C. W. Wirts, M. E. Rehfuss, W. J. Snape and P. C. Swenson have carried out an extensive investigation on the effects of tea drinking on gastric secretions and gastric motility.[1] The effects of tea generally have been ascribed to its caffeine and tannin content, but reliable information on the effect of tea tannin is limited. It is often assumed that tea tannin behaves in the gastro-intestinal tract as the ordinary tannic acid and tannin of pharmacy. These will combine with and precipitate proteins and act as astringents and inactivators of pepsin. Pseudotannins, which make up a considerable portion of tea tannin, have a feeble action in this regard. In tea there is probably a combination of caffeine and tannin in the ratio 1:3, so that, on this premise, neither caffein nor tannin would be present in a free state in the stomach in sufficient amounts to exert the deleterious effects that each might independently possess.

The tea used in these experiments was made in the American fashion and contained about 45 milligrammes (0·75 grain) of caffeine per cup of 150 millilitres. The amount taken in the experiments was 300 millilitres with 10 grammes of sugar and drunk either at 55° C. to 60° C. or at 5° C. The subjects were patients with inactive duodenal ulcer or functional gastro-intestinal disorder. Over 300 intubation studies in 114 persons were performed. The effects of both tea and sweetened water were determined in each subject on different days. Liquid meals of fat, protein or carbohydrate were given through a gastric tube just prior to the test. Tap water, saline solution and tea all left the stomach at the same rate.

Tea added to gastric juice, obtained by histamine stimulation, had no appreciable effect on total acid, pepsin and pH values and there was no flocculation. When tea alone

[1] *J.A.M.A.*, June 19, 1954.

was given to ulcer patients there was little difference in pH, but the free acid was somewhat higher than when water alone was given. When a fat emulsion was given with tea as compared with water, there was no significant difference in the pH, free acid and pepsin. When peptone or carbohydrate was given there was an increased rate of emptying of the stomach with tea as compared with water. When protein, fat and carbohydrate were given tea caused an increased rate of emptying. Fluoroscopic tests gave similar results and so too did studies with the intragastric balloon. From these and other data it appears that tea as customarily prepared with sugar and taken in average amounts of two cups is not a potent gastric secretagogue in the fasting state and in the post-cibal state. Iced tea leaves the stomach quicker than hot tea. Since tea increases gastric tone and the rate of gastric emptying, it would appear that the postprandial relief which tea often gives after a heavy meal is brought about by its effect on the gastric musculature. It is felt by the authors that their observations justify the long-held belief that a cup or two of tea with meals has value in aiding digestion. There is, as yet, no evidence that the caffeine or tannin of the tea has any specific effect in this regard, for caffeine has no action on the gastro-intestinal tract of man and little is known about the tannin. Tea then, taken as a beverage in average amounts, need not be contraindicated in the treatment of most gastro-intestinal conditions.

EFFECTS OF CIGARETTE SMOKING.

MUCH is being made of the possible relation of cigarette smoking and lung cancer, but other effects, more immediate in action, occur which may at times be important. Grace M. Roth[1] has examined the effects of cigarette smoking on the cardio-vascular system of normal persons and patients with hypertension. Known factors which might influence peripheral circulation were reduced as much as possible by keeping the subjects in a room with constant temperature and humidity in the supine position and free from external stimuli. During the control period the temperature of the plantar surfaces of first and third toes and the volar sides of first and third fingers was determined at ten-minute intervals. Blood pressures and pulse rates and the basal metabolic rates were also determined. When fairly constant readings were obtained the subject smoked two cigarettes in succession and the observations were made at one-minute intervals until thirty minutes to an hour after smoking ceased. The subjects inhaled the smoke. Six normal subjects were examined on a number of occasions. The skin temperature of the extremities of all the subjects decreased an average of 2·5° C. (4·5° F.) for the toes and 3·2° C. (5·8° F.) for the fingers. The average increase of blood pressure was 20 millimetres of mercury, systolic, and 14 millimetres, diastolic. The pulse rate was increased an average of 36 beats per minute. The electrocardiographic changes consisted of increased heart rate and decreased amplitude of *T* waves. After smoking, the blood pressure, heart rate and electrocardiogram returned to normal within five to fifteen minutes. The lowering of skin temperature of the extremities persisted half an hour to an hour or even longer. In any individual the responses varied from day to day according to the basal metabolic rate. Habitual smokers did not show tolerance to the effects of smoking. Smoking then constricts the blood vessels of the extremities, whereas alcohol dilates the blood vessels. Observations were made to determine whether the taking of alcohol had any effect on the reactions to smoking cigarettes. Smoking tests, from 30 to 90 minutes after the ingestion of ethyl alcohol, equivalent to two fluid ounces of whisky, demonstrated that the alcohol did not prevent vasocontriction from smoking.

Smoking tests were made on 26 patients with labile blood pressure. During the smoking the systolic blood pressure increased an average of 38 millimetres of mercury and the diastolic 30 millimetres. Similar tests carried out on 16 patients with hypertension disclosed an average increase of 38 millimetres in the systolic blood pressure and 23 in the diastolic blood pressure. The average basal blood pressure of these 16 patients was 170 millimetres, systolic, and 117, diastolic. Since in the hypertensive patient the rise of the blood pressure is greater than in the normal individual it would be wise to advise hypertensive patients to cease smoking. Separate experiments demonstrated that it was the nicotine in the smoke which caused the vascular changes.

[1] *J. Am. Geriatrics Soc.*, May, 1954.

ESSENTIAL NOCTURNAL ENURESIS.

LIKE many imperfectly understood conditions, enuresis is elusive in its response to treatment, though new therapeutic ideas and accompanying claims are not lacking. However, understanding is growing. S. I. Roland[1] defines essential nocturnal enuresis as urinary incontinence during sleep in patients above the age of three years, when there is no ascertainable organic lesion. He points out that the association of enuresis with abnormally deep sleep has received little attention in medical literature; yet in a consecutive series of 51 children, who had no organic disease either of the urinary tract or of the central nervous system, he found a history of unusually deep sleep with difficulty in awakening in three-quarters of the cases. Kleitman has stated that sleep is brought about by a break between the cortex and the brain stem, probably in the hypothalamus. Cortical control of the bladder consists of inhibition of spinal reflexes. While our knowledge of the mechanism of micturition is as yet incomplete, there seems to be an anatomical functional relationship between deep sleep and urinary incontinence. In this study, observations were made to see if enuresis could be blocked by the sleep-opposing action of amphetamine. The ages of the 57 patients ranged from four to twelve years; three-quarters of them gave a history of unusually deep sleep. All were given five milligrammes of *d*-amphetamine sulphate, in an elixir, at bedtime. They were requested to empty their bladders before going to bed, and were instructed to turn off an alarm clock when it rang four hours later, empty the bladder and return to bed. The parent was not to assist the child to turn off the alarm or to help him to empty his bladder. If treatment was unsuccessful after one week, the dose was raised to ten milligrammes. If two dry nights (or more) occurred in the first week, the smaller dosage was continued for three weeks, then stopped. Higher doses than ten milligrammes were found to be of no extra value. No toxic or untoward reactions occurred. No unusual sleeplessness or restlessness occurred in the period of therapy. Of the 51 patients, 47 were relieved of enuresis during the first three weeks, and remained dry at night, with only rare incontinence, for at least six months thereafter, this being the period of follow-up. The author states that in cases of failure a further course may be given after one month without therapy. The results are, of course, uncontrolled and susceptible to criticism, but they are sufficiently encouraging to warrant further trial of the method of treatment.

[1] *J. Urol.*, February, 1954.

CLINICAL AND LABORATORY RESEARCH IN MEDICINE.

A WEEK or two ago a broadcast was given on the National Network by Sir Howard Florey, F.R.S., Professor of Pathology at the William Dunn School of Pathology in the University of Oxford. This broadcast, which caused a certain amount of resentment among clinicians, has been published in *The A.B.C. Weekly* of September 11, 1954. At the outset, Sir Howard Florey said that he thought it was most desirable that Australians should know how research carried out in laboratories was modifying medical practice. He went on to say:

> It is possible that you imagine the advances in medical research of the past half-century or so have been mainly or exclusively due to the efforts of those working in hospitals.

> This is far from the truth, for nearly every procedure in diagnosis, treatment and prevention of disease now applied in the hospital or home took its origin or owes its development to laboratory work.
>
> The same is also true in the field of public health. All the great public health triumphs of this century, such as the control of malaria in many countries, are based fundamentally on microbiological, chemical and pharmacological studies.

This statement is likely to give a false impression to the Australian public. No one will deny for a moment that workers in the laboratory have made discoveries of the greatest possible benefit to the community. Their location, their training and their freedom from the trials and worries experienced by a practitioner are in favour of their success. When we think of what the clinician has done, we call to mind at once the work of Gregg on maternal rubella and the occurrence of abnormalities in the fœtus. This was done by clinical observation and nothing else, and the observations have had far-reaching results. Again, the work of W. N. Pickles in England on the epidemiology of disease was epoch-making and has put his name on the same plane as that of Mackenzie, who, by clinical observation, revolutionized teaching on the heart and its diseases. The surgery of the heart and great vessels did not spring from the laboratory; it has been the work of enterprising clinicians. Few people who heard Sir Howard Florey's broadcast or read his article will take note of the words "owes its development to". The implication here, of course, is that work completed in the laboratory does not always originate in the laboratory, and Sir Howard Florey himself would be the first to admit this. We think that Sir Howard Florey has rather over-emphasized the position and that the impression created is not fair to the careful clinical observer who notices and records unusual occurrences in his often tedious and monotonous work.

PSI.

Psi, a term which has been coined to include such phenomena as telepathy, clairvoyance and precognition, has for many years been the subject of scientific inquiry. In a recent book Jan Ehrenwald[1] has briefly reviewed the evidence for its existence and given case notes which point to the reality of telepathy which occurred between the patient and the psychoanalyst. Dreams are quoted in which, so it appears, intricate material could have been imparted only by a sense which transcends the use of words. It is claimed that telepathy is a reality and as such must take a place in the armoury of every physician. Ehrenwald, realizing that he is treading the airy mazes of magic, is careful to document his pages with quotations which betray wide reading and an open mind. He concedes that psi phenomena counter our spatial and temporal concepts, but holds that we must discuss them in a framework with new concepts of time, space and causality. He points out that Freud was prepared to believe that telepathy could play a part in the psychoanalytical situation.

In a chapter on the ego, the id and psi, there is a description of the unconscious which shows how our notions of past, present and future are hopelessly jumbled. "Distance is no longer an obstacle to action and action itself may be inhibited in scope and consequences propelled by the driving power of the instinct." There is a parallel between the psi and the id as if there was an intimate connexion. It is noteworthy that the unconscious reveals itself in dreams and hypnosis, just as psi is revealed in states of passivity and relaxation. Attention is drawn to the concept of empathy as the imaginative projection of consciousness into that of another person. The art of putting oneself into another's psychological shoes is important in treatment. There is a relationship to telepathy and hence to psi. The examples of telepathic communication between marriage partners are numerous. Ehrenwald quotes one of his cases and refers to Szondi's work on "fate analysis". He infers that the missing factor which accounts for the inexplicable affinities of many marriages and for love at first sight may be the elusive psi.

A primal conflict is the child's quest for autonomy—to live his own life. He is exposed to endless influences on his conscious level (ego), and to the myriad ramifications in his unconscious (id). Ehrenwald postulates an equally important third entity, the psi. The ubiquity of the latter is well described in the following words: "Disregarding the operation of the psi factor in the making of the vast tapestry of our contemporary Western civilisation—and of all civilisations which come into our purview—would, however, be just as irrational as for fish to overlook the water in which they swim. Psi is a medium common to all humanity—whether or not we are aware of its existence."

Ehrenwald includes chapters on personality structure and the cerebral localization of the psi. It is considered that the question of the precise site of action in the brain is unimportant. Rather there must be faced a new outlook, which includes a psychotherapeutic gradient and a pluri-cerebral localization. Lives are not separate but integrated in larger wholes.

The final section of the book deals with the practical application of the psi thesis. It is obvious that its reality creates an important problem. The patient can unwittingly influence the doctor and vice versa. It is conceivable that therapeutic failure may be due to the non-recognition of this process. Furthermore, the existence of a new channel of communication offers opportunities for exploitation in the therapeutic field. Ehrenwald believes that psi can be harnessed to the good of humanity and tells us how and why. At the very least he has written a stimulating book, which serves as a reminder that there are still unknown regions of the mind worthy of our close attention.

[1] "New Dimensions of Deep Analysis: A Study of Telepathy in Interpersonal Relationships", by Jan Ehrenwald, M.D.; 1954. London: George Allen and Unwin, Limited. 8½" × 5½", pp. 316, with 13 text-figures. Price: 25s.

TETRACYCLINE.

Chlortetracycline ("Aureomycin") and oxytetracycline ("Terramycin") have now been in general clinical use for a considerable time, but it is only comparatively recently that their chemical structures have been determined, and even more recently that it has been realized that the structure common to the chemical structures of these two antibiotics is itself an antibiotic for which the name "tetracycline" has been proposed. Originally prepared from chlortetracycline, it now appears that tetracycline is readily produced by one of the streptomyces species. Tetracycline is a broad-spectrum antibiotic with, in many ways, a similar role to oxytetracycline and chlortetracycline, and it seems likely to be clinically important. Its main known features have been described recently by M. Finland *et alii*[1] and by Henry Welch,[2] who summarizes ten papers on tetracycline delivered last year at the first annual symposium on antibiotics sponsored by the United States Department of Health, Education, and Welfare, Food and Drug Administration, Division of Antibiotics, in collaboration with the journal *Antibiotics and Chemotherapy*. According to Finland *et alii*, the antibacterial activity of tetracycline closely resembles, and in most respects is almost identical with, that of oxytetracycline and chlortetracycline. There is essentially complete cross-resistance among the three tetracycline analogues *in vitro*. Chlortetracycline is considerably less stable than either of the other two analogues when kept in solution, particularly in an alkaline medium. Satisfactory blood levels are sustained during treatment with oral doses of 250 or 500 milligrammes of tetracycline hydrochloride given every six hours, and high concentrations are maintained in the urine during treatment with such doses. After single oral doses of one gramme, the concentrations of antibiotic obtained in the plasma appear to be somewhat higher with tetracycline than with the other two analogues. Finland *et alii* describe a clinical trial carried out on 118 patients treated with tetracycline, most of them for infections of the urinary or respiratory tracts. The clinical and bacterio-

[1] *J.A.M.A.*, February 13, 1954.

[2] *Antibiotics & Chemother.*, April, 1954.

logical effects of such treatment appeared to be similar to those obtained in a recent study with oxytetracycline or chlortetracycline in similar cases. The major clinical difference between tetracycline and the other two analogues is the distinctly lower incidence of untoward gastro-intestinal symptoms resulting from the use of tetracycline, and these results suggest that further clinical trials with tetracycline are warranted. However, it is as well to realize that, as Welch points out, in spite of the preliminary data which show fewer patients with side reactions to tetracycline, some patients, while under treatment with the new antibiotic, have developed diarrhœa, others have suffered from nausea and vomiting, and still others have had all three. Recently, evidence has been presented that this antibiotic has been associated also with *erythema multiforme* of the buccal mucous membranes. Welch also mentions evidence in favour of caution in assigning "equivalent antibacterial activity" to oxytetracycline, chlortetracycline and tetracycline. He states that it may be that the close similarity of the molecular structures of these three drugs has led to this assumption. If this is the case, it is one of "presumption over fact", since it is well known that the antibacterial activity of chlortetracycline differs from that of oxytetracycline with certain strains and species of bacteria. Furthermore, a number of differences in the therapeutic results have also been reported. With the facts now before us we can, as Welch states, expect corresponding differences with tetracycline. Reports of further trials of its use will be awaited with interest.

THE CHANGING PICTURE OF ENDOCARDITIS.

IT is well known that the incidence of bacterial endocarditis has declined greatly since the introduction of antibiotics and chemotherapy, but certain morphological changes in the picture of endocarditis as recently described by Alfred Angrist and Jeanne Marquiss are less well known.[1] Taking the year 1946 as the time prior to which inadequate treatment or no treatment for bacterial endocarditis had been administered at their hospital (Queen's General Hospital, Jamaica, New York), Angrist and Marquiss compared the findings in relation to the heart valves from 5033 post-mortem examinations performed in the period from 1936 to 1946 with those from 3643 post-mortem examinations in the period from 1946 to 1951. They found that with the decrease in bacterial endocarditis since the advent of antibiotics and chemotherapy, there had been a simultaneous and corresponding increase in the incidence of non-bacterial, thrombotic endocardiosis. This, as they point out, implies control of the factors formerly leading to the infection of such lesions and favours the concept that the bacterial lesion often arises as a result of infection of the thrombotic, non-bacterial vegetation. They go on to state that the known tendency towards healing of subacute bacterial endocarditis is greatly enhanced by modern therapy. Transitional lesions between the basic forms of endocarditis are seen with increasing frequency, and the basic individual forms approach each other more closely. Distorted valves with perforations and bulky, calcified vegetations occasionally represent healed bacterial vegetations, but more often they are the result of healed degenerative endocardiosis. With regard to the occurrence of emboli, Angrist and Marquiss state that non-bacterial vegetations constitute an important source of embolization, often leaving little evidence at the site of origin on the valve. Some of the gland infarcts encountered in cases of septic endocarditis apparently originate from such non-bacterial sites. It was found that the valves previously damaged by rheumatic distortion, aging or any mechanism favouring fibrotic scarring and hyalinization showed a greater tendency to collagen degeneration, a finding which accounts for the known frequency of vegetations of all forms on such damaged valves. Angrist and Marquiss point out that thrombotic, non-bacterial endocardiosis is linked with a fundamental, metabolic fault of collagen metabolism in which the endocrine system, the aging process and the nutritional status seem to play a part. This implies that the original morbid anatomical distortion in all cases of endocarditis is a biochemical one still to be elucidated.

[1] *Am. J. Path.*, January-February, 1954.

THE STORY OF SYPHILIS.

IN the story of syphilis there exist all the elements of drama, and the historian cannot altogether be blamed for taking full advantage of them; but he should guard against allowing his enthusiasm to lead him too far into the land of supposition. Just because syphilis was widespread and virtually incurable during the sixteenth, seventeenth, eighteenth and nineteenth centuries, it is unjust to assume that practically everybody was at one time or another smitten with this disease. Nor is it reasonable to assume that nearly every nervous disorder or derangement of mind might be traced to the spirochæte. Unfortunately, that is what James Cleugh often appears to do, as with an almost terror-stricken amazement he writes the history of the main venereal disease.[1] Much of what he recounts will be well known to the average medical reader, though the latter may find it in the unfamiliar apparel of history when he is more used to reading it from clinical records.

Baudelaire and Nietzsche are known to have been syphilitic; but it may surprise medical readers to learn that Frederick the Great, Napoleon Bonaparte, Beethoven and Schumann were, in the opinion of James Cleugh, also victims of the secret enemy. They may have been; but the evidence is equivocal, and no Wassermann test existed as the final arbiter. Nevertheless, syphilis is Cleugh's hobby-horse. With more literary skill than clinical care he lays the spirochæte at the door of kings and emperors, poets, musicans and politicians. He sees the spirochæte in every aberration of conduct. In every frivolity, in flamboyant excursion, in dazzling achievement and in uncertain brilliance he tracks the fatal treponema. As a romance, "Secret Enemy" is eminently readable. Its style is both attractive and compelling. As a clinical document it is somewhat open to question, but its opening and closing chapters are commendable.

[1] "Secret Enemy: The Story of a Disease", by James Cleugh; 1954. London: Thames and Hudson. Sydney: Walter Standish and Sons. 8½" × 5½", pp. 278. Price: 18s.

URINARY AND FÆCAL INCONTINENCE DUE TO CONGENITAL ABNORMALITIES IN CHILDREN.

A PATIENT with both urinary and fæcal incontinence is always uncomfortable because of constant soilage and skin maceration. He is malodorous, socially unacceptable and therefore unable to indulge in many of the activities of a normal life. Urinary infection producing severe illness is a frequent episode, and in most cases renal failure produces a merciful death. Anything that a surgeon can do to ameliorate this distressing state is acceptable. Faced with such a problem in two children, both of whom had *spina bifida* and one of whom had many other congenital abnormalities, Alexander H. Bill, junior, David H. Dillard, Harold E. Eggers and Ole Jensen, junior,[2] used the "Bricker" procedure, and in both instances gratifying clinical results ensued. The "Bricker" procedure consists of transplantation of both ureters into one end of an isolated segment of ileum, which is then brought out on the abdominal wall to act as a urinary conduit. Bill and his colleagues state that, according to Bricker, this procedure was first carried out clinically by Haffner, of St. Louis, and to their knowledge it has been employed in humans only in those cases in which radical excision of the pelvic viscera was performed. They are to be congratulated. All too frequently children suffering from severe congenital defects are denied the possible benefit of surgical procedures on the grounds that as the condition is incurable, and as death must at some time result from the condition, any surgery, because it cannot offer a lasting benefit, is meddlesome. This short-sighted attitude is not to be commended.

[2] *Surg., Gynec. & Obst.*, May, 1954.

Abstracts from Medical Literature.

PHYSIOLOGY.

The Cuirass Respirator and Paralysed Poliomyelitis Patients.

C. R. COLLIER AND J. E. AFFELDT (*J. Appl. Physiol.*, March, 1954) report that the majority of patients with chronic complete respiratory paralysis due to poliomyelitis can be given adequate artificial ventilation by means of the cuirass respirator as shown by tidal volumes and alveolar carbon dioxide levels. The chest-abdomen cuirass is more efficient than the chest cuirass, being 61% and 47%, respectively, as efficient as the tank respirator. Both lack the reserve of the tank respirator. A means is described of calculating the theoretically desired tidal volume at a fixed respiratory rate in a patient with hypo-hyperventilation. It is felt that completely paralysed chronic poliomyelitis patients provide a unique opportunity for the valid comparison of various methods of artificial respiration.

The Relation Between Dental Overbite and Aerotitis Media.

C. S. WHITE, J. E. ROBERTS AND H. W. MERIDETH (*J. Aviation Med.*, April, 1954) report that 147 commercial airline pilots and stewardesses with various grades of dental overbite were studied to establish the relation between incisal overclosure (without overshoot) and the ease of ventilating the cavities of the middle ear as judged by the incidence of aerotitis and the habitual use of the Valsalva manœuvre. Of 104 individuals, 56 or 53·8% had experienced aerotitis on at least one occasion. The data were considered sufficiently definitive to justify further research, and indicated that if malocclusion proved to be of significance in subjects of aerotitis, it would prove so in individuals with intermediate incisal overclosures without overshoot. The results are discussed and attention is directed to three possible ways in which intermediate dental overbite may influence the ventilation of the cavities of the middle ear—namely, derangement of the soft tissues of the Eustachian canal, changes in the lumen of the bony portion of the canal, and congenital or developmental variation in the Eustachian tube (cartilaginous and bony portions) which may be associated with the anomaly of overbite and will produce hypoventilation of the tube.

Blood Pressure Measurements in Men at Rest and Work.

A. HENSCHEL, F. DE LA VEGA AND H. L. TAYLOR (*J. Appl. Physiol.*, February, 1954) report that comparisons were made by the sphygmomanometric and intraarterial (electromanometer) methods of the blood pressures of 11 men at rest in the supine and standing positions, during several grades of work (walking on a motor-driven treadmill) and for three minutes of recovery. During standing and work the systolic pressure was under-estimated by the indirect method by mean values of eight to 15 millimetres of mercury. During the first three minutes of recovery, this method over-estimated the systolic blood pressure by mean values of 16 to 38 millimetres of mercury. During the hardest work level, that of walking at 3·5 miles per hour on a 10% grade, and during the first minute of recovery, a number of subjects were found in whom reasonable values for diastolic pressure could not be determined by the indirect method.

Reduced Tissue Pressure and Blood Flow in the Finger.

S. YAMADA AND A. C. BURTON (*J. Appl. Physiol.*, February, 1954) report that the effect of reduced tissue pressures up to −100 millimetres of mercury on the blood flow of the finger has been studied in five normal subjects, with the venous-occlusion plethysmograph under reduced plethysmographic pressure. Reduction of tissue pressure reduces the blood flow greatly. It is reduced to 50% at −40 millimetres of mercury and to 10% at −100 millimetres of mercury. This is interpreted as evidence, additional to that obtained by changes of level, that distension of the venous bed elicits a constriction of the local arterioles by a "veni-vasomotor reflex". On this interpretation, the receptors in the veins are shown to respond to stretch of the wall rather than to absolute pressure in the vessel. The cybernetic aspects of such a veni-vasomotor reflex are discussed.

Positive Tissue Pressure and Blood Flow in the Finger.

S. YAMADA (*J. Appl. Physiol.*, February, 1954) reports that application of a steady positive pressure to the finger reduces its blood flow, as it does in the forearm. When a critical tissue pressure, which is still less than the arterial pressure, is applied, the blood flow becomes zero. The difference between the arterial pressure and the tissue pressure which causes cessation of flow, taken as the critical closing pressure, is significantly greater than zero. When the subjects are taken from vasoconstriction to full vasodilatation by heat, the range of the critical closing pressure for the finger is from 10 to 56 millimetres of mercury, which is very similar to that of the forearm. In spite of the similar range of critical closing pressures, finger blood flow is much more variable than forearm flow. This can be attributed to the presence in the forearm of muscle flow, which is less variable than skin flow, and also to the presence of arteriovenous anastomoses in the finger. There is a highly significant correlation between the level of the critical closing pressure in the finger and the resistance to flow at high pressure. This is interpreted to mean that the vessels which close are the arterioles, which contribute the major part of the resistance to flow.

Respirators and Circulatory Responses.

J. V. MOLONEY, JUNIOR, AND S. W. HANDFORD (*J. Appl. Physiol.*, February, 1954) report that experimental animals with competent circulatory and respiratory systems tolerate either the positive-negative or the intermittent positive type respirators without major alterations in blood pressure or cardiac output. In the presence of respiratory failure and/or circulatory embarrassment, the intermittent positive type machines cause a depression in cardiac output and blood pressure which is sometimes fatal. The positive-negative type machines are distinctly superior in such circumstances, since they maintain adequate cardiac output and blood pressure. This latter type of respirator owes its desirability to a more favourable effect on venous return to the heart. The objection that a negative pressure phase during expiration may produce pulmonary œdema is not supported by experimental findings or theoretical considerations.

Breaking Point of Breath-Holding.

W. S. FOWLER (*J. Appl. Physiol.*, March, 1954) reports on experiments in which after voluntary breath-holding of maximal duration, untrained subjects rebreathed a gas mixture containing 8·2% oxygen and 7·5% carbon dioxide. This mixture afforded sufficient relief from respiratory distress for the subject to be able to resume breath-holding for two additional periods of shorter duration, despite progressively decreasing degrees of arterial oxygen saturation and increasing alveolar tension of carbon dioxide. After breath-holding, the second inspiration was of smaller volume than the first, generally because of a reduction in mean rate of inspiratory flow. This result is not readily explained. The distress which terminated breath-holding was attributed to sensory patterns accompanying hypercapnia, the stimulation of breathing induced thereby and the voluntary effort required to oppose involuntary breathing movements.

Ventilatory Response to Carbon Dioxide in Pulmonary Emphysema.

S. M. TENNEY (*J. Appl. Physiol.*, February, 1954) reports that the ventilatory response to carbon dioxide is diminished in the patient with pulmonary emphysema to an amount which is proportional to the degree of resting carbon dioxide retention. This general relationship defines a trend which the subject without pulmonary disease also obeys if he has a disturbance in acid-base balance resulting in changed carbon dioxide retention. As the degree of carbon dioxide retention is corrected in the subject without pulmonary disease, his ventilation response changes in a predictable fashion according to this trend. The carbon dioxide content in the subject with respiratory acidosis secondary to chronic pulmonary emphysema can be lowered by the carbonic anhydrase inhibitor "6063", but his ventilation response to inspired carbon dioxide is less than predicted. This appears to be due to the mechanical limitations of that disease. Certain predictions concerning changes in the sensitivity of the respiratory centre secondary to carbon dioxide adaptation in health or disease are made and discussed.

BIOCHEMISTRY.

Kynurenine.

C. E. DALGLEISH AND S. TEKMAN (*Biochem. J.*, March, 1954) have found that in a large proportion of cases the febrile human excretes hydroxykynurenine. This excretion is, in particular, unrelated to tuberculosis or diabetes. It is attributed to a high rate of breakdown of body protein. In states associated with weight loss but not accompanied by fever, hydroxykynurenine excretion could not be detected. The normal human taking

an excess of tryptophane by mouth excretes much kynurenine, but no (or a negligible quantity of) hydroxykynurenine.

Bread.

R. R. ROSENBERG *et alii* (*Arch. Biochem.*, April, 1954) have investigated the nutritional effect which may be obtained by the addition of lysine, methionine, valine and threonine to a diet composed of commercial white bread, fat, salts and vitamins and fed to weanling rats. A beneficial effect could be observed only from addition of lysine. The results of these experiments indicate that, as far as rat growth is concerned, the only amino-acid deficiency in commercial white bread is lysine.

Cholesterol.

H. H. HERNANDEZ *et alii* (*J. Biol. Chem.*, February, 1954) have fed cholesterol-4-C^{14} and epi-cholesterol-4-C^{14} to rats that had cannulas inserted into their thoracic ducts. The rate of appearance of C^{14} in the lymph of each rat was measured, and the C^{14}-containing compounds in lymph were characterized. Cholesterol was identified as the major C^{14}-containing compound in the lymph of rats fed cholesterol-C^{14}. Approximately 50% of the cholesterol recovered in the lymph was esterified. Epi-cholesterol was identified as the only major C^{14}-containing compound in the lymph of rats fed epi-cholesterol-C^{14}. Cholesterol is more rapidly absorbed than is epi-cholesterol.

Cholesterogenesis.

S. HOTTA *et alii* (*J. Biol. Chem.*, February, 1954) have compared the rates of incorporation of the C^{14} of acetate-1-C^{14} into cholesterol by livers of two groups of alloxan-diabetic rats. One group was fed a diet containing 60% glucose, the other a diet containing 60% fructose. The capacity of the liver of the glucose-fed diabetic rat to incorporate the C^{14} into cholesterol was more than twice that observed with livers of normal rats fed either the high glucose or the high fructose diet. The rate of hepatic cholesterogenesis in diabetic rats was restored to normal by the feeding of the high fructose diet.

Nitrogen Balance.

W. C. ROSE *et alii* (*J. Biol. Chem.*, January, 1954) have carried out nitrogen balance studies in normal young men and demonstrated that lysine and tryptophane are indispensable dietary components. The exclusion of either from the food is followed promptly by a pronounced negative nitrogen balance, which is relieved by the return to the diet of the missing amino acid. On the contrary, arginine, like histidine, is not a necessary component of the food for the maintenance of nitrogen balance in the adult male of the human species. The final classification of amino acids essential for maintenance of nitrogen equilibrium in the normal adult man is valine, leucine, isoleucine, threonine, methionine, phenylalanine, lysine and tryptophane.

Tissue Lipides.

L. A. JEDEIKIN AND S. WEINHOUSE (*Arch. Biochem.*, May, 1954) have found palmitate-1-C^{14} to be incorporated into lipides of rat tissue *in vitro*. In experiments with liver slices and homogenates, incorporation into phospholipides and non-phospholipides was significantly higher in tissue from fed than from fasted animals. A dependency on respiratory activity for incorporation into phospholipides was indicated by a higher incorporation with oxygen than with nitrogen in the gas phase, and by inhibiting effects of respiration inhibitors. Similar effects were not observed for incorporation of palmitate into non-phospholipides. Coenzyme A was found to stimulate incorporation of palmitate into phospholipides added as an aqueous emulsion to extracts of pigeon liver acetone powder. These results are regarded as indicating that the fatty acid ester bonds of phosphatides are formed by stepwise transesterification between acyl coenzyme A and either glycerophosphorylcholine or glycerophosphate. A similar mechanism is probably not involved in the formation of the glyceride ester bond.

Lactose.

R. E. TRUCCO AND R. CAPUTTO (*J. Biol. Chem.*, February, 1954) have isolated a new lactose derivative from the mammary gland of rats. It has been named neuramin-lactose to account for the fact that the only two components so far detected are neuramic (or sialic) acid and lactose. These two components account for 88% of the dry weight of the best preparation obtained.

Vitamin D.

S. A. BELLIN *et alii* (*Arch. Biochem.*, May, 1954) have reported that vitamin *D* increased the amount of urinary citrate excreted by young rats kept on rations varying widely in mineral content. These rations ranged in composition from those providing an adequate mineral intake to those made grossly deficient in calcium, phosphorus and other minerals. The biggest percentage increase in citrate was obtained with phosphorus-containing rations; but supplements of phosphorus, given in the form of neutral solutions of potassium phosphate to a low phosphorus ration, reduced citrate elimination. An increase in urinary pH induced by vitamin *D* with rats on low phosphorus rhachitogenic rations was not obtained with rations adequate in phosphorus, yet an increase in citrate elimination resulted in all instances. Inasmuch as a supplement of vitamin *D* increased the amount of urinary citrate far more than did an additional large intake of sodium bicarbonate, it appears that the effect of vitamin *D* is due to an increase in citrate synthesis rather than to a decrease in its destruction.

Digestion.

B. BORGSTROM (*Arch. Biochem.*, April, 1954) has shown that the incorporation of free acids into glycerides during digestion of fats in the lumen of the small intestine of rats is due, partly at least, to a real synthesis of new glyceride-ester bonds. Experiments with C^{14}-labelled decanoic acid fed dissolved in olive oil have shown that this acid is absorbed more rapidly than long-chain fatty acids from the small intestine of rats, and that decanoic acid is also utilized for synthesis of glyceride-ester bonds during digestion *in vivo*. Butyric acid fed dissolved in glyceride is even more rapidly absorbed from the small intestine than is decanoic acid, and any incorporation into glycerides of this acid could not be demonstrated in the lumen of the small intestine of rats. Fed monoglycerides are significantly hydrolysed in the lumen of the small intestine before absorption. Fatty acids liberated from glycerides in the small intestine of the rat are absorbed more rapidly than the glycerides.

Chlorides.

W. D. SCHENK (*Arch. Biochem.*, March, 1954) has shown that with the Parr bomb and micro-Casius method, analysis for tissue chloride gives much higher values than those obtained with the Van Slyke technique. The Van Slyke method, however, gives correct values for blood. The chloride content of various organs of the dog and rabbit was determined.

Cholesterol.

E. SCHWENK *et alii* (*Arch. Biochem.*, March, 1954) have obtained an extract from pig livers after perfusion with C^{14}-carboxyl-labelled sodium acetate, alkaline hydrolysis and extraction with pentane. This was separated into four main fractions by chromatography or alumina. The pentane eluates contained squalene-C^{14}, which after intraperitoneal injection or feeding to rats was converted into cholesterol-C^{14}. Two other fractions from the chromatogram also gave cholesterol-C^{14} on intraperitoneal injection into or feeding to rats. Squalene was also for the first time isolated from a mammalian (pig) liver. It is concluded that besides squaline a number of intermediates of the conversion of acetate into cholesterol are present in the non-saponifiable matter of perfused livers and possibly also of normal livers.

Fat Deficiency.

P. D. KLEIN AND R. M. JOHNSON (*Arch. Biochem.*, February, 1954) have shown that rats placed on a fat-free diet lose dienoic, tetraenoic and pentaenoic acid from cytoplasmic particles at a high initial rate, which declines in six weeks. Thereafter, the losses proceed very slowly, in some cases without change for twelve or fourteen weeks. The largest losses are found in the microsomal fraction, and the least in the mitochondrial. The trienoic acid accumulates in all fractions, reaching levels of four to six times those found in the fraction under normal conditions. Since these alterations occur approximately six weeks before the onset of external symptoms of fat deficiency, it is suggested that the primary lesion in fat deficiency may take place earlier than was previously suspected and may bear only a secondary relationship to the external conditions.

Progesterone.

W. TAYLOR (*Biochem. J.*, March, 1954) has studied the in-vitro metabolism of progesterone with rat-liver slices and suspensions of disintegrated tissue and found that this tissue contains an enzyme or enzymes which metabolize this steroid. The metabolism is increased by the addition of either diphosphopyridine nucleotide or nicotinamide or both, and of citrate to the reaction mixture; it is not inhibited under anaerobic conditions. In a large-scale experiment, 28% of the progesterone incubated with rat-liver "homogenate" (with added nicotinamide) could be accounted for by the isolation of 5α-pregnan-3:20-dione and 5α-pregnan-3α-20-one and of unchanged progesterone.

On the Periphery.

ON AUTOBIOGRAPHIES, DIARIES AND THEIR WRITERS.

WRITING, or worse still, publishing an autobiography, seems to be a not uncommon expression of personal feeling, vanity or memories, and possibly a method of paying off old scores. There are many such volumes, mostly needless and uninteresting. Sometimes, perhaps pardonably, they represent a kind of occupation, an effort indeed to mitigate the boredom which sometimes troubles the days of desuetude. They are a sort of vicarious outlet for internal musings on the past—not always clever, correct or truthful—of mediocre minds; just the small beer of nobodies, and, I repeat, often owing their origin to sheer vanity. But there are others, in some instances "alas too few", which do display the true inner character, good or bad, of the writers.

I think I am unfavourably swayed by reading some recent personal stories by quite unremarkable men of medicine of our own generation, or near it: men whose mediocrity is familiar and about whom no record is either useful or interesting. But sometimes it is otherwise, and you really find a star, and the quiet reading of such a book, which truthfully tells the hopes and fears and sorrows of a fine personality, is a solace to your own, and a spur to make a decent voyage of what remains to you of life. These are true vibrant human documents and living pictures. Probably most of us are familiar with these world-famous revelations of the authors—such as Benvenuto Cellini, Evelyn, Marie Bashkirtseff, Amiel, and Sénancour who wrote "Obermann".

The world would have been poorer if Samuel Pepys's too short a diary had not been discovered and interpreted. Again with all its loosness William Hickey gave us an unforgettable picture of Anglo-Indian life in the late eighteenth and early nineteenth centuries. No full story could be written of the struggle between Britain and France for the prize of Hindustan without the help of this amusing old dog's book of memory.

Think of what we owe to James Boswell, in spite of his own distressing frankness, which if just a little too tough for the 1950's, at least is honest and convincing. What a service he did to posterity in his meticulous story of Samuel Johnson! It is as much his own story as that of his hero. All praise to James Boswell, that most wonderful of "Bear Leaders", who showed and demonstrated to posterity the learning, the grimacings and the real goodness of the great lexicographer.

But can one justly blame the autobiographists for not writing wholly truthful and uninhibited pictures of themselves, their doings, and their thoughts, even when they wrote without either the fear or the hope and intention of publication? Nobody likes to broadcast in print, or even to admit to themselves the mean emotions, the countless selfish, cowardly or evil thoughts that everyone has almost daily, all of which make up the sum total of the strange medley of individual life. I confess I have no small sympathy with this form of *"suppressio veri"*.

Take religious emotions. What greater spiritual indecency can one witness than the deplorable manifestations of a pathological piety at a revivalist meeting? There, sinners, naked and apparently unashamed, tell the tale of their nastiness to a responsive appreciative chapel full of gossiping witnesses, mostly at the moment emotionally foolish. The law in civilized cold countries prohibits, rightly or wrongly, complete nudism in public—and custom and a modern outlook have generally endorsed such prohibition. But the nakedness of the body has its analogue in indecency of the soul or spirit. And so the best men and women in all restrained communities of educated people have preserved, for the most part, a treasured silence concerning things of the spirit and the emotions.

Even until quite recently a veil has hung over our somatic processes. But I rather gather from the talk of "flaming youth" of both sexes that even the closest guarded thoughts on body functions, such as the misadventures of their own abdominal viscera, are cheerfully discussed with that detachment and candour formerly used when talking of a decaying tooth, or an ailing Spaniel. *Tempora mutant nos et mutamur.*

However, these franknesses, sometimes quite surprisingly picturesque, have their good side, for an honest, wholesome matter-of-factness in discussing such things by both sexes has its commendable side, and I do not think it does anybody any real harm. After all human beings have various organs, and it is not really sinful to have a troubled colon or a sorely tried *sphincter vesicæ*. But such matters were not alluded to by the "nicest people" in the days of our Elizabeth's great-great-grandmother. And one has now no real sympathy with the refined, prudish lady who put attractive looking trousers on the legs of her piano. No, I fear, when we of an older generation write or speak in language which we call frank and wholly honest about our own inner lives we do really deceive ourselves, and the truth is not in us, in either the spoken or written word.

> Beneath the surfaced stream of what
> we say we feel,
> Beneath the stream, as light as what
> we think we feel,
> There flows, with noiseless current,
> strong, obscure and deep,
> The central stream of what we are indeed.

I am sorry I do not know who wrote these lines (I read them many years ago) quoted by Maudsley in his book "The Physiology of the Mind". Something of the same sort of inward vision has often occurred to other men. Matthew Arnold, indeed, who I think expresses the *Zeitgeist* of modern life better than most men, has something to say very like them in his "Buried Life".

Such personal records of really great persons, in autobiography, diary or letters, are admirable, but I repeat, there exist too many mediocrities from whom you learn nothing except to stay your pen when you think of committing your own colourless small beer to cold print.

When I look round the people I have known, in and out of our profession, I find just a tiny but radiant few with credit, distinction and duty well done, who possessed indeed all the knowledge and ability to make a written record of their pilgrimage through this wilderness not only amusing and interesting, but of permanent value to those who, still stumbling, follow in their footsteps.

Let such folk write and give us their own presentation of their life and work. Let them tell us where and when they were born—of the stock from which they sprang. Let them put down what was best, in their judgement, of their contemporaries, and let off the backsliders as kindly as is consistent with truth, but not too gently, for although almost all hands are really a good deal lower than the angels, yet a half-friendly valedictory kick in some cases is quite justifiable.

Alas, the very people who best should write their own story are often inarticulate in speech or pen, holding their peace and making no sign, to our regret and loss, while, as regards some who did write, they make us sorry that they, too, had not remained silent.

R. SCOT SKIRVING,
Sydney.

British Medical Association News.

SCIENTIFIC.

A MEETING of the New South Wales Branch of the British Medical Association was held on June 24, 1954, at the Robert H. Todd Assembly Hall, British Medical Association House, 135 Macquarie Street, Sydney, DR. T. Y. NELSON, the President, in the chair.

Infectivity in Infectious Diseases.

DR. H. MCLORINAN, Medical Superintendent of the Fairfield Hospital, Victoria, read a paper entitled "Changes in Infectivity of Infectious Diseases" (see page 533).

PROFESSOR LORIMER DODS agreed with Dr. McLorinan about the apparent alteration in the significance and in the age incidence of infectious hepatitis. He said that twenty-five or thirty years previously, so-called "catarrhal jaundice" seemed to be predominantly a very mild and transient disease of childhood, which was usually dismissed with relief, as "just the yellow jaundice". During the past ten or fifteen years there had been an increasing awareness of the significance of the infection, and there appeared to have been a shift in the incidence of the disease to an older age group. Professor Dods expressed some anxiety about the admission of affected children to the wards of a hospital during the earlier stages of the infection and asked Dr. McLorinan for his advice about adequate barrier nursing precautions for such patients.

Professor Dods pointed out that increasing freedom of visiting in children's hospitals had raised questions about

parents visiting children who were suffering from diphtheria, acute infective diarrhœa and certain other infectious diseases. He felt that with reasonable precautions—which might include the wearing of gowns, as a public health gesture—there was no reason why parents should not visit such wards, but asked for Dr. McLorinan's opinion about the question.

Dr. Edgar Thomson first asked Dr. McLorinan if he would say at what stage an infectious disease was most infectious. He then asked Dr. McLorinan what should be done about the giving of whooping-cough vaccine to children during a period of high incidence of poliomyelitis in the community, and whether any decision had been made on that point in Melbourne. Finally Dr. Thomson asked Dr. McLorinan which infectious diseases required the nursing of the patient in complete isolation, and which would permit the nursing of the patient in a general ward with safety.

Dr. S. E. J. Robertson said that considerable difficulty was caused by the rather archaic rules governing isolation of children, and he hated to think how much schooling was lost through unnecessary isolation. Dr. Robertson asked Dr. McLorinan, first, at what stage he thought mumps became non-infectious. Some work done in Philadelphia had shown that it was difficult to transmit the virus of mumps after the parotitis had subsided. Dr. Robertson then referred to the old rule that a child who had had chickenpox should not return to school until the last scab had fallen off; that might take six weeks. Dr. Robertson asked Dr. McLorinan whether that was really necessary. With regard to whooping-cough, Dr. Robertson said that it was fairly well known that it was difficult to isolate the *Hæmophilus pertussis* after the whoop had developed. He asked Dr. McLorinan whether whooping-cough was still infectious soon after that.

Dr. R. T. C. Hughes said that he had a personal problem to put to Dr. McLorinan concerning a workers' compensation case. He asked Dr. McLorinan what was the longest period before the onset of the first symptoms of poliomyelitis during which he would regard the patient as being infective. In the case he had in mind, the patient was a kindergarten school teacher, and he had collected all the information he could to determine whether she could have caught poliomyelitis from two children in her class who subsequently suffered from it. The only information he could get was from one source, which gave the relevant period as seven days before the onset of symptoms. He had come across a statement in the proceedings of one International Conference on Poliomyelitis in which a speaker had referred vaguely to a long time, and in the discussion one man had mentioned nineteen days. Dr. Hughes said that that seemed a very long time to him.

Dr. H. O. Lancaster asked whether it was possible in Victoria to get more precise details about the age incidence and mortality rates in infectious diseases. Such statistics were available for England. The mortality from whooping-cough was very great in the first year of life and less later. Dr. McLorinan, in discussing poliomyelitis, had made much of the change in the age incidence because of the transfer of organisms from one person to another, whereas in discussing the fall in mortality from measles and other diseases he had made little of this factor. Dr. Lancaster thought that non-specific factors, such as changes in living habits and family size, might have been given more importance. Further, Dr. McLorinan had limited his discussion to the last ten years, and in that period it was quite fair to give the chief credit to the antibiotics and sulphonamides. However, the incidence of many of the diseases under discussion had been falling since 1900 or thereabouts, and non-specific factors should be taken into account in assessing the fall in their incidence.

Dr. P. M. de Burgh asked Dr. McLorinan whether he had any precise figures bearing on Professor Dods's question about the increasing age incidence of infectious hepatitis. He said that the age incidence of admissions to hospitals should give the required information. With regard to the future of infectious disease, he said that there was no sign of control of droplet infections; for example, there was no recent fall in the morbidity of tuberculosis, although there had been a great fall in mortality. In the series quoted by Dr. McLorinan in which there was contact with poliomyelitis virus at an earlier age in the lower than in the higher income groups, there was no difference for influenza or mumps between the two groups.

Dr. J. G. Radford said that in his experience over the last seven years the incidence of scarlet fever in general practice had not fallen. The vast majority of patients had been treated at home, and therefore they might not have been included in the statistics. Dr. Radford then referred to a peculiar upper respiratory and throat infection which occurred in Sydney; the throat was inflamed, sometimes with vesicles, there was no clinical or pathological evidence of glandular fever, and the condition was not responsive to antibiotics. It was intensely painful. Dr. Radford wondered if it had been a type of Coxsackie infection, and he asked Dr. McLorinan if he had encountered the condition in Melbourne.

Dr. Nelson, from the chair, expressed the thanks of the meeting to Dr. McLorinan. He said that the great advances in immunization had been stressed. Dr. McLorinan was probably aware that, because of the outbreak of diphtheria in New South Wales, there was some discussion as to whether immunization should be made compulsory or not. It was the responsibility of the medical profession to stimulate the public to have children immunized, and not all reliance should be placed on the public health authorities. A change had occurred in the types of infectious diseases: now the staphylococcus was more important than the streptococcus, and even more important were virus infections. Medical practitioners still found a large number of cases that they labelled virus infections for want of something better.

Dr. McLorinan, in reply, thanked those present for their appreciation. He referred first to Professor Dods's question about the precautions required if patients suffering from infectious hepatitis were nursed in general wards. Dr. McLorinan said that at the Fairfield Infectious Diseases Hospital they had a method of grading infections. A blue card was used for patients who were non-infectious. A red card was used for infectious patients, and that meant that the usual precautions were taken in nursing them. The next grade of infectivity was covered by a red card with one star, and in the nursing of those patients all the usual precautions were taken together with the disinfecting of the excreta. Finally the highest infectivity was indicated by the use of a red card with two stars, and that meant the taking of complete precautions. He would put infectious hepatitis in the one star group, which meant the use of separate gowns, appropriate hand-washing and the disinfection of the excreta. He thought also that possibly the patient's food scraps might be disinfected. Dr. McLorinan said that even though it was his idea that children got the infection usually mildly, they could carry it and pass it on to others after they returned home. In summary, in any general ward full barrier nursing precautions should be used in the care of patients suffering from infectious hepatitis.

The second question raised by Professor Dods had to do with the likelihood of transmission of infections through the increased freedom of visiting patients suffering from infectious diseases. Dr. McLorinan said that that slight danger did exist; but at Fairfield a set of instructions was given to every visitor, and the wearing of gowns was demanded. He agreed with Professor Dods that that might be considered a gesture; but it was good training for the nurses. At Fairfield they had discarded the use of masks. Professor Dods's next question referred to the impossibility of avoiding the fumigation of a home when a case of notifiable disease was brought to the notice of the authorities, and whether the fumigation was of any value. Dr. McLorinan said that it was a relic of the Dark Ages, and he did not know why it had not been abolished. At Fairfield, for the fumigation even of fomites (the patient's clothing *et cetera*) they used formalin. He did not know whether it was very effective. They certainly did not use steam disinfection, which ruined certain materials. In other words, the public should be educated up to the uselessness of what they thought was important.

In reply to Dr. Thomson's first question, Dr. McLorinan said he thought that most infectious diseases were at their greatest infectivity when the infecting agent was present in the respiratory tract. Poliomyelitis was most infectious in the preparalytic stage. The virus was certainly in the excreta as well; but in hospital he did not think it a very dangerous disease from the excretal point of view. If it was, why did not more nurses contract it when they were nursing affected children? Also, as they had seen in winter time, it did not seem to behave like a disease with excremental spread. Nevertheless, poliomyelitis could remain infectious for some considerable time from the excremental point of view; it had been stated that the virus could be recovered from the excreta up to three weeks. As for the infectivity of other diseases such as virus infections of the respiratory tract, Dr. McLorinan thought that it ceased within a few days of the height of the fever or the occurrence of the exanthem or whatever the manifestation was. He thought that the common cold was not infectious for very long. In reply to the question that had been asked about

the wisdom of immunizing children against whooping-cough during a period of high incidence of poliomyelitis, Dr. McLorinan said that it was safe to give the vaccine to a child aged under one year. The risk of paralytic poliomyelitis under the age of one year was rather slight. He would not give whooping-cough vaccine at all to children over the age of two years. Dr. Thomson had asked which infectious diseases allowed the patient to be safely nursed in the general wards, and which required his nursing in splendid isolation. Dr. McLorinan said that he did not know. He thought poliomyelitis required isolation. Cross-infections, though few, did occur. During the 1937-1938 epidemic of poliomyelitis, when the dangers of tonsillectomy were not known, a child in the scarlet fever ward had his tonsils removed. On the same day a child was admitted to the ward with the diagnosis of scarlet fever, but with a peculiar temperature; he later was found to be suffering from non-paralytic poliomyelitis. Exactly eleven days afterwards, the first child developed bulbar poliomyelitis; that proved that the poliomyelitis virus was conveyed to his tonsillar fossæ. Dr. McLorinan thought that children suffering from infectious diseases should be isolated if for any reason they had to be admitted to hospital. Most children could be nursed at home if the conditions were suitable. Isolation was not so important as it used to be.

Dr. McLorinan then referred to the questions that had been asked by Dr. Robertson about the loss of schooling through isolation of children, and the stage at which mumps became non-infectious. He agreed with the Philadelphia workers that it was very difficult to transmit mumps virus after the parotitis had subsided. After mumps, chickenpox, measles and all such infections, his own opinion was that the patient could go back to school as soon as he was well; the same applied to contacts, who should not be kept away from school at all. Measles was not worthy of consideration as a serious disease. However, the position was different with whooping-cough; it could be very serious, and it did not respond rapidly to antibiotics. He thought whooping-cough patients should be kept at home for three weeks; but some children would not be well enough to go back to school even at the end of four weeks; convalescence was often very slow. With regard to poliomyelitis, Dr. McLorinan said that even though he believed in the natural processes of immunization, he still thought that contacts should be kept away from school for fourteen days. Up to the present their knowledge of poliomyelitis was more theoretical than practical, and their management of the disease should leave no room for criticism.

Dr. McLorinan then replied to Dr. Hughes's question about the longest period prior to the appearance of the first symptom of poliomyelitis during which he would regard the patient as being infectious. Dr. McLorinan could not recall any work done on that subject. On purely theoretical grounds he would say that for about two or three days before the actual febrile illness the virus was in the respiratory tract and the patient was probably infective. Work had been done on the question of viræmia, and that appeared to occur about five, six or seven days before the appearance of symptoms. Dr. McLorinan did not think that the patient was necessarily infectious because he had viræmia. Dr. Hughes had asked whether a patient could be infective nineteen days before the onset; the answer was that he could not.

Dr. Lancaster had referred to the age incidence of poliomyelitis; Dr. McLorinan said that he had no precise figures, and referred Dr. Lancaster to Dr. B. McCloskey, of the Victorian Department of Health. Dr. Lancaster had also stressed the importance of social conditions in relation to the incidence of infectious diseases. Dr. McLorinan agreed that they must have had a tremendous effect on the incidence, in some ways for good, in some, perhaps, not for good; but in general it had to be granted that improved social conditions had had a good effect. Dr. Lancaster had regretted the fact that Dr. McLorinan had confined his paper to the last ten years. Dr. McLorinan said that he had really included the period from about 1935 or 1936 onwards. He agreed that the effect of non-specific factors on the incidence of infectious diseases should be taken into consideration. Dr. de Burgh had said that the incidence of infectious hepatitis was increasing; Dr. McLorinan agreed, and said that the infections were undoubtedly more severe in adults than in children. He was surprised to be told that the morbidity from tuberculosis was increasing; he thought it had diminished. There were plenty of empty beds in Victoria for tuberculosis patients, and patients were certainly recovering more quickly. Dr. Radford had said that the incidence of scarlet fever had not decreased; Dr. McLorinan thought that it had. However, he might have been misled by the fact that a number of patients were now treated at home. Dr. Radford had described an unusual type of respiratory infection; Dr. McLorinan said that it sounded very like herpangina, but he had not seen it. In Victoria they did not see many Coxsackie virus infections.

Dr. McLorinan, in reply to Dr. Nelson, said that diphtheria immunization was not compulsory in Victoria, and he thought it politic not to make it so. As soon as a thing was made compulsory, objections to it were raised and arguments against it advanced. The case for immunization was so strong that compulsion was unnecessary.

Medical Societies.

PÆDIATRIC SOCIETY OF VICTORIA.

A MEETING of the Pædiatric Society of Victoria was held at the Royal Children's Hospital, Carlton, on Wednesday, May 12, 1954. The subjects "Epithelial Heterotopia in Intestinal Diverticula" and "The Adreno-Genital Syndrome" were discussed.

Epithelial Heterotopia in Intestinal Diverticula.

DR. REGINALD WEBSTER demonstrated from lantern slides preparations relating to a group of children, the members of which had all suffered a clinical crisis directly attributable to epithelial heterotopia in diverticula of the alimentary tract. Dr. Webster said that by the term "heterotopia" was to be understood the occurrence at a given site in the digestive tract of depots of epithelium which were foreign to that region, but which were typical of some other portion of the alimentary canal. The most frequently observed example of such ectopia had been the intrusion of wayward intestinal villi into the mucous membrane of the fundus of the stomach; gastric glands adrift in the upper reaches of the œsophageal mucosa, or marooned in the alien environment of the mucous membrane of the small intestine, and accessory pancreatic tissue in the wall of either stomach or intestine, constituted other well-recognized types of heterotopia.

The terms "superficial" and "deep" heterotopia indicated that the misplaced epithelial islets lay within or without the *muscularis mucosæ* respectively. In the vast majority of instances the phenomenon was a congenital developmental anomaly, but it might be initiated later in life by erratic regeneration of alimentary mucous membrane which had been destroyed by ulcerative processes. Thus epithelial heterotopia of the alimentary tract might be considered as superficial or deep, congenital or acquired. Accessory pancreatic tissue was the most frequently occurring instance of deep heterotopia, but all the examples which Dr. Webster proposed to present fell within the category "congenital superficial heterotopia", and all had been associated with intestinal diverticula.

The first specimen had been resected from a baby, aged ten months, who had exhibited intermittent and severe melæna for one month prior to the operation which determined the origin of the hæmorrhage. Laparotomy revealed the presence of a diverticulum, arising from the mesenteric surface of a loop of small intestine, which from the character of its mucous membrane was obviously jejunum. The stoma, which though patent was very small and resembled a dimple, as it appeared in the lantern slide was of exaggerated size as the result of the manipulations to which the specimen had been subjected. Dr. Webster demonstrated the presence of a shallow ulcer in the apical portion of the diverticulum. The differing appearances of the mucous membranes of the intestine and diverticulum respectively, evident to macroscopic inspection and apparent in the slide, suggested strongly that the mucosa of the diverticulum was not identical with that of the segment of jejunum from which it arose. Such impression was abundantly confirmed by the examination of microscopic sections. Photomicrographs were projected for comparison of the histological appearance of the typically intestinal mucous membrane of the accommodating jejunum with that of the diverticulum, in which the central, chief or peptic cells and the distinctive parietal or oxyntic cells of gastric tubular glands were clearly demonstrated. Dr. Webster submitted that in its microscopic characters the mucosa of the diverticulum was a faithful representation of gastric mucous membrane.

The second specimen was a short and blunt-nosed diverticulum of the small intestine of a boy, aged five years, whose dominating clinical feature was intestinal hæmorrhage

As was to be seen in the photograph, the cap of the diverticulum had been incised and laid back on the hinge of serous covering, to permit an appreciation of the hyperplastic character of the lining mucous membrane, which in its exuberant growth had reduced the lumen of the diverticulum to a very narrow channel. In the obverse, as shown in the next slide, the character of the mucous membrane indicated the jejunum, rather than the ileum, as the locus of the diverticulum, and a conspicuous feature was the presence of an ulcer, eroding the mucous membrane immediately around the stoma. A photomicrograph demonstrated that the mucous membrane of the diverticulum was histologically identical with that of the first specimen, providing a characteristic picture of gastric mucous membrane.

In commenting upon the first two specimens, Dr. Webster said that apart from that occurring in relation to a Meckel's diverticulum, superficial heterotopia in the small intestine appeared to be a rare condition. The finding of gastric heterotopia in two diverticula of segments of the bowel with mucous membrane typically that of the jejunum, which from their situation on the mesenteric surface of the gut could not possibly be of Meckelian origin, seemed to indicate revision of a statement in one of the earlier papers of the late Professor G. W. Nicholson, distinguished Dean of the Faculty of Pathology at Guy's Hospital, that congenital gastric heterotopia had not been noted in the intestine below the level of the duodenum, except when located in persistent remnants of the vitelline duct. Dr. Webster said that the hyperplastic quality of the ectopic gastric mucosa to which he had drawn attention in the second of the two jejunal diverticula, and which would be seen to be a feature of his third specimen, were observations at variance with the dictum of A. L. Taylor—that in superficial heterotopia there was no excess of tissue, the alien epithelium merely replacing that proper to the part concerned.

Meckel's diverticula frequently harboured heterotopic glandular tissue, and were, as it was probably unnecessary to reiterate, remnants of an incompletely obliterated vitelline duct. At the time of its definition in the embryo, the vitelline duct was possessed of an entodermal lining which had precisely the same potentialities for development as the intestinal entoderm itself, and if for any reason the duct remained patent, either wholly or in part, differentiation of its entoderm might ensue in any of the directions included in the potentialities of the original germinal layer. It was therefore not surprising to find epithelial heterotopia associated with Meckel's diverticula, and the next specimen furnished an example of such relationship.

The third specimen had been obtained from a boy, thirteen years of age, who had been admitted to the Royal Children's Hospital on account of intestinal hæmorrhage, of a degree which reduced the number of his red blood cells to 1,800,000 per cubic millimetre and his hæmoglobin value to 35%. Vague abdominal pain and intermittent melæna continued for twelve days, at the end of which period exploratory operation disclosed the presence of a Meckel's diverticulum. Features of the diverticulum were, as shown in the lantern slide, (i) a mucous membrane exhibiting exaggerated plications or *valvulæ conniventes*, (ii) an ulcer in the mucous membrane of the neck, and (iii) a sessile nodule at the fundus, which was demonstrated in subsequent photomicrographs as composed of hyperplastic and ectopic gastric mucous membrane.

The fourth patient in the group was an infant, aged twenty months. Again the story was one of melæna—three major attacks during a period of four months—and anæmia. Other methods of investigation having been exhausted, Dr. Russell Howard operated and resected a Meckel's diverticulum, in the base of which was found an ulcer. Photomicrographs of sections of the mucosa of the diverticulum projected were conclusively those of gastric glandular tissue.

Continuing, Dr. Webster said that in the great majority of instances, epithelial heterotopia in the alimentary tract was of academic rather than clinical interest; it was of not infrequent occurrence, as indicated by the work of A. L. Taylor, who had found 69 examples of varying types in two years of intensive study of the subject, and was limited, almost without exception, to that portion of the gut which lay above the level of the ileo-caecal valve.

Dr. Webster said that the congenital diverticula which he had presented were all true diverticula, in that their structure, like that of the bowel from which they arose, included a serous coat, a double layer of muscle, submucosa and mucous membrane. At the stage in development at which the blueprints for such anomalies appeared, the fœtal entoderm retained its capacity for differentiation in the several directions which the modifications of mucous membrane appropriate to different portions of the alimentary tract required, and seemed to participate in the prevailing irregularity to the extent of differentiating perversely, and elaborating mucosa normally indigenous to a distant site in the alimentary canal.

Dr. Webster observed that it was when located in a diverticulum that heterotopic glandular tissue was likely to lead to serious clinical developments. Without doubt the most frequent and significant clinical sign was intestinal hæmorrhage, as instanced by all four children, the pathological basis for whose melæna he had endeavoured to define. Ulceration, either of the mucous membrane of the diverticulum or of the mucosa of the bowel in the neighbourhood of the stoma, was a common occurrence, and had been generally attributed to the retention of relatively stagnant acid peptic secretion in a diverticulum of small stoma, or the devitalizing effect of such secretion on intestinal epithelium not conditioned or inured to it. Perforation also was a contingency to be included in the reckoning, and such a complication had occurred in a boy, twelve years of age, from whom a diverticulum of the ileum, non-Meckelian, misapprehended as a mesenteric cyst and subsequently proved to contain gastric glandular tissue, had been successfully removed at the Royal Children's Hospital in March, 1944. The boy displayed no intestinal hæmorrhage, but presented with the clinical features of acute appendicitis.

Peptic ulceration of a Meckel's diverticulum could be said to be established as a clinical entity, and instances had multiplied in the literature since Humbert collected details of six illustrative cases and reported a seventh in a French medical journal in 1924. In six of the seven cases in that early recorded series the underlying condition manifested itself by repeated intestinal hæmorrhage, and in five it culminated in perforation. All the patients were young males, their ages ranging from eleven months to twenty-eight years. The five children upon whom the discussion had been based were all boys, aged ten months, twenty months, five, twelve and thirteen years respectively. Prompt recovery from the essential surgical measures and a happy issue out of their afflictions had been recorded for all of them.

Dr. Webster concluded by demonstrating, from "Kodachrome" projections with which he had been kindly provided by Dr. Alan Williams, ulcerative and pre-ulcerative processes in the mucosa of five additional Meckel's diverticula.

DR. F. DOUGLAS STEPHENS asked whether the ulcer always occurred in the part of the mucosa which showed the presence of oxyntic cells or the part close to that region.

Dr. Webster, in reply, said that the ulcer might occur in adjoining normal mucosa, whether it was in intestine or diverticulum.

DR. J. COLEBATCH asked whether there was a history of preceding dyspepsia in cases of this type, but Dr. Webster did not know of any such symptoms.

DR. V. L. COLLINS said that he had wondered whether a patient with ulceration in a Meckel's diverticulum could present with anæmia and not melæna. In the last 20 cases it seemed that one child had had no frank hæmorrhage but did show anæmia.

Adreno-Genital Syndrome.

DR. MURRAY CLARKE introduced the subject of the adreno-genital syndrome by showing a chart which he had prepared; this illustrated the fact that sexual aberration in children could be divided into four main groups according to the cause: cerebral, gonadal, adrenal and congenital.

The cerebral group was subdivided into organic and "constitutional". This "constitutional" subgroup was the largest variety of sexual aberration and consisted of precocious puberty, which excited concern and often caused unnecessary investigations including exploratory laparotomy. The children affected were much above average height and weight, but suffered the disability of early fusion of their epiphyses and became adults of short stature. Amongst the boys were a number of record-breakers in under-age athletic events. The mature development of the testis was paralleled with the growth of the penis in the cerebral group, in contrast to the failure of development of the testes in the adrenal group. The condition was commoner in girls, and Dr. Murray Clarke advised observation without action when the patient presented with only early growth of pubic hair or development of breasts; should the aberration be due to an ovarian tumour, an abdominal mass would always be palpable; if it was due to the adrenals, it would manifest itself by an enlarged clitoris.

The adreno-genital syndrome resulted in different forms depending on the sex of the patient and the age when the abnormal adrenal made its impact. In pre-natal life hyperplasia of the adrenals produced "pseudohermaphroditism"

in the female and virilism in the male. After birth hyperplasia or tumour of the adrenal produced virilism in males and females.

Dr. Murray Clarke showed practically identical photographs of the genitalia of three babies who suffered from adrenal hyperplasia, severe hypospadias and intersex respectively. Intersex was a term applied to individuals having testes but female development of the genital ducts and presenting a very real problem in differential diagnosis and management. Biopsy of the gonad was sometimes required to classify it as a testicle.

In cases of adrenal hyperplasia the usual clinical picture at birth was gross enlargement of the clitoris, the condition of which closely resembled hypospadias; it was hooked forward by bands of fibrous tissue and had a ventral groove of mucous membrane leading to a small orifice. The *labia majora* were grossly hypertrophied, and the skin over them was wrinkled so that they simulated a bifid scrotum.

Dr. Murray Clarke explained that this characteristic appearance was due to the fact that the adreno-cortical hyperplasia disturbed the development of the female genital tract after the twelfth week, when normal anatomical relationships between urethra and vagina had become established and the uro-genital sinus had disappeared. The Müllerian duct had developed into Fallopian tubes, uterus and vagina, while the Wolffian ducts had disappeared.

Examination with a urethroscope might demonstrate a uro-genital sinus with two inner orifices, the urethra anteriorly and the vagina posteriorly, obscured by surrounding frilly tags of mucous membrane. Injection of lipiodol might reveal the vagina, uterus and tubes.

Acceleration of bone growth was characteristic. Dr. Murray Clarke showed X-ray films of the wrist of a child, aged three years, whose centres of ossification were those of a child approaching puberty.

In less severe cases the vaginal orifice could be seen by retracting the labia firmly.

In most severe cases the labio-scrotal folds were fused in the mid-line to form an empty scrotum, and the meatus was placed on the under-surface of what appeared to be a large penis.

At first sight the solution appeared to be removal of the clitoris, but that failed to take into account the natural history of the condition. At about three years of age pubic hair appeared, later axillary hair appeared, with acne on face and back, and a booming voice, characteristic, but unlike any boy's. Premature closure of the epiphyses resulted in development of a short stocky individual. Hair appeared on the face with subsequent need for shaving. No breast development took place, and amenorrhœa was present. There was resistance to œstrogen therapy.

Until the advent of cortisone therapy it was often argued that the individual would be happier brought up as a male if plastic operations converted the phallus into an organ through which urine could be passed. An early decision had to be made, and this was difficult, as the patient's bias to one or other sex depended on many factors, including environment and the attitude of parents and others.

Should post-natal adrenal hyperplasia or a virilizing tumour occur, there was normal development until the onset of symptoms, then rapid progress of virilization, very high 17-ketosteroid levels and radiological evidence of a tumour from excretion pyelogram and perirectal insufflation of air. The administration of cortisone could be used as a therapeutic test, as in cases of hyperplasia it would inhibit the adrenal and cause a fall in 17-ketosteroid levels, but in cases of tumour the 17-ketosteroid levels would rise even further. Sometimes laparotomy was necessary before a diagnosis could be made.

Dr. Murray Clarke emphasized the point that, in spite of the possibilities of cortisone treatment, there was still a place for surgery in a variety of ways which he enumerated; investigation; clitorectomy in certain cases; plastic operations to construct a urethra in other selected cases.

Operations to reduce over-activity of the adrenals by excision of most of the adrenal tissue had been most disappointing, as the remaining tissue rapidly hypertrophied. In these cases post-operative supportive treatment with cortisone, DOCA and the intravenous administration of fluids and electrolytes was of the greatest importance; crises developed particularly when an adrenal tumour was removed, probably because the contralateral gland had been inhibited.

The exact role of surgery in the adreno-genital syndrome in the future was uncertain, and the last word did not seem to have been said by the advocates of cortisone therapy.

Dr. W. B. Macdonald said that he proposed to present the case histories of five female infants with congenital bilateral adrenal hyperplasia who had been treated successfully with cortisone.

Until 1950, treatment had been confined to surgical removal of one adrenal gland, or one gland and part of the other, together with administration of œstrogens, if it had been decided to raise the child as a girl. That treatment was disappointing, and virilism was rarely if ever decreased.

In 1950 Lawson Wilkins, of Johns Hopkins Hospital, had introduced cortisone therapy, and had followed the clinical courses of 19 patients over the following two years. The results were most encouraging. After those successes, this form of therapy had been widely adopted. Professor Lorimer Dods and Dr. R. Vines, of Sydney, had recently presented and published the results of cortisone treatment of six children with adreno-genital syndrome.

Dr. Macdonald said that to understand the mode of action of cortisone, it was necessary to understand the nature of the disorder causing the adreno-genital syndrome. Many children suffering from the disorder also had a mild to severe degree of sodium depletion with dehydration resembling an infantile Addisonian state. If that aspect of the disorder was investigated more thoroughly, probably most infants with congenital adrenal hyperplasia would be found to have some degree of sodium depletion.

Dr. Macdonald said that at least three theories had been offered to explain this combination of "pseudohermaphroditism" and virilism with a sodium-losing tendency. The first, most simple but least likely, was that congenital hyperplasia of the *zona reticularis* of the adrenal cortex firstly brought about the secretion of excess androgens in intrauterine life with their effect on sex differentiation, and secondly caused by infiltration or by pressure effects an atrophy of the *zona fasciculata* and *zona glomerulosa*. This atrophy resulted in insufficient secretions of these two zones—namely, insufficient glucocorticoids and mineralocorticoids. The theory seemed rather specious and received no histological support. Furthermore, although the infants had severe salt-losing tendencies, most of them had normal titres of 11-oxysteroids, which could be increased by the administration of ACTH, and had no clinical evidence of disturbances of glucocorticoids.

The second theory postulated that abnormal cortical hormones were produced, or that the excessive androgen titre caused an imbalance of cortical hormones with a preponderance of those which aided sodium excretion rather than reabsorption. This theory was held at present by Lawson Wilkins and Lorimer Dods, and seemed theoretically acceptable. Few adrenal corticoids were effective in sodium reabsorption, some were "fence sitters", whilst others in certain circumstances facilitated sodium excretion.

A third theory, offered by Stuart Mason and Morris, attributed the primary defect to a late stage of steroid synthesis in which ACTH played no part. An intermediate enzyme necessary for production of glucocorticoids and mineralocorticoids was deficient. The consequent low titre of these hormones, by a negative feed-back mechanism, stimulated ACTH secretion, which in turn could act solely on the androgen-producing *zona reticularis*. Androgens had no depressant effect on the anterior part of the pituitary, as opposed to cortisone and other corticoids. The objections to this theory were, firstly, the demonstration by others that the 11-oxysteroid titres were often high, and, secondly, that the *zona glomerulosa* with its mineralocorticoids probably was not under anterior pituitary lobe control.

Even if none of the theories was correct, the fact remained that cortisone depressed androgen production and reduced significantly urinary 17-ketosteroid titres. Not only was this demonstrable biochemically, but clinical feminization of female children with the andreno-genital syndrome was achieved. To date, results had far surpassed those obtained by surgical extirpation of the adrenals and by administration of œstrogens, and had displaced both those methods. However, surgery remained a necessary adjuvant to a good functional and cosmetic result.

Unfortunately cortisone was a weak sodium-retaining hormone, and, by itself or even in combination with added sodium chloride, could not correct the sodium deficiency in some infants severely affected with an Addisonian-like state. For those infants desoxycorticosterone acetate was necessary; this in combination with sodium chloride kept them in electrolyte balance, whilst cortisone depressed the androgen secretion by its feed-back action on the anterior pituitary lobe.

Dr. Macdonald then demonstrated, with the aid of photographs and charts, the case histories of five children. Two had been treated from infancy and were of the sodium-losing type, whilst three had reached mid-childhood before receiving cortisone therapy, and had not suffered from Addisonian-like states during infancy.

The first infant had been ill, wasted and dehydrated on admission to hospital. She had an enlarged clitoris and a uro-genital sinus. The 17-ketosteroid titre in a twenty-four hours specimen of urine was 6·4 milligrammes, the serum sodium concentration was 127 milliequivalents per litre and the potassium concentration was seven milliequivalents per litre. Intramuscular cortisone therapy reduced the 17-ketosteroid level to 0·35 milligramme per twenty-four hours, and oral cortisone therapy had kept it at two milligrammes or less for over two years. Cortisone, even with the addition of five grammes of salt to the diet per day, was not sufficient to stabilize her serum electrolyte concentrations, and administration of desoxycorticosterone acetate was necessary. For the past fifteen months, this had been administered by means of pellet implantation. Over the past two years, childhood infections had caused a rise in 17-ketosteroid excretion, and on one occasion pertussis and morbilli contracted simultaneously had coincided with a reduction in the dose of DOCA. An Addisonian crisis had occurred, and the child was lucky to survive. Since then the DOCA therapy had been maintained. The child was at present very well and appeared to be a normal little girl on casual examination. The clitoris had not increased in size and could be seen only by separation of the *labia majora*.

The second infant had been examined at the age of three weeks. Cortisone depressed her urinary ketosteroid levels to normal, but weight gain was unsatisfactory. The serum sodium concentration was 136 milliequivalents per litre. There was no clinical dehydration, but the addition of five grammes of sodium chloride to the feeding per day resulted in a good steady weight gain, and a return of serum electrolyte concentrations to normal.

The third and fourth children had been aged six and eight years respectively when treatment was commenced. At that stage of development they were taller than average for age, and their bony ages were supernormal. Both girls were masculine and were embarrassed and resentful in demeanour. Both had *acne vulgaris* and faulty postures. One had a deep voice. Their urinary 17-ketosteroid excretions were 34 and 57 milligrammes per twenty-four hours respectively. On receiving cortisone therapy, they had become obviously more feminine. Their complexions had cleared, their posture had improved, their attitudes had changed, and smiles had replaced scowls. Dr. Macdonald referred to the projected photographs, which demonstrated the feminine appearances of both children. The elder girl had obvious breast development, and had commenced to menstruate.

The urinary 17-ketosteroid levels in both had fallen considerably but were still in the region of seven to fifteen milligrammes per twenty-four hours. Attempts to reduce the levels further with intensive intramuscular therapy had failed, and both children had been maintained at that level by oral administration of cortisone (50 milligrammes per day). Failure to depress urinary 17-ketosteroid levels beyond seven to eight milligrammes per twenty-four hours had been observed also by Lawson Wilkins, and by Lorimer Dods and Vines.

Dr. Macdonald said that the clinical results obtained in these two cases were gratifying, and both children and parents were thrilled with the changes.

The fifth child presented a different problem. She had attended the out-patient department as a boy with hypospadias and undescended testes, and such was the masculinity of her external genitalia that her true sex was not suspected. The scrotum was rugose with a median raphe, and the urethral opening was close to the *glans clitoris*. The appearance of pubic hairs, acne and increased growth at the age of five years made it apparent that the child had the adreno-genital syndrome. A retrograde urethrogram showed a normal male type of urethra with no genital opening. There had been no canalization of the Müllerian tubercle. Laparotomy revealed normal ovaries, Fallopian tubes and a uterus, and biopsy confirmed the presence of ovarian tissue. As the child could never be a functional female, or even be acceptable in female company, bilateral oophorectomy was performed. By that procedure it was hoped that psychological changes occurring at puberty, as well as the physical discomfort resulting from retention of menstrual products, would be avoided. The child was quite happy as a boy, and was accepted in boys' company. He was at present receiving cortisone therapy to prevent too early epiphyseal fusion with consequent curtailment of growth.

Dr. Macdonald concluded by saying that the patients whose clinical courses had been demonstrated provided a good variety of the examples of adreno-genital syndrome with female "pseudohermaphroditism". It was obvious that if those children were treated from infancy, the abnormalities could be controlled more easily.

The second point was that the condition of infants with Addisonian features was frequently uncontrolled by treatment with cortisone even with added sodium chloride. Cortisone was an unreliable sodium-retaining hormone, and DOCA was essential for patients severely affected, if Addisonian crises were to be averted.

Thirdly, even though the condition of children in the older age group was not completely controlled on biochemical criteria, clinical improvement was so impressive and gratifying that treatment should be continued.

Insufficient time had elapsed to allow determination of the duration of treatment necessary. Lawson Wilkins had shown that cessation of treatment even after two years' therapy resulted in a rise in urinary 17-ketosteroids titres, but not to their previous levels.

DR. H. BETTINGER, in opening the discussion, stated that care should be taken with the use of the word hermaphrodite. Regarding the cases under discussion he was reluctant to call them pseudohermaphrodites. Intersex occurred in any condition in which the male and female influence was disturbed. All the so-called pseudohermaphrodites started off as a female genetic type, but then the influence of the other sex came in. The psychological development was often in contrast to the anatomical development, and he was glad to see that this fact had been taken into consideration in the present instance.

Dr. Bettinger went on to say that the value of surgical treatment was perhaps not as low as had been mentioned. He showed slides illustrating two cases in which adrenalectomy had been performed and improvement obtained. The pubic hair had decreased, and one patient had started to menstruate. He said that precocious puberty in girls was actually far more common than the condition under discussion, and the distinction was clinically easy. The patients did not menstruate early in cases of adreno-genital syndrome, and a large clitoris was the most important feature to be noticed. The hairy girl with no enlarged clitoris did not belong to this group; no treatment would help her, and the less investigation to which she was subjected the better.

DR. S. W. WILLIAMS asked whether emotional stress could precipitate an Addisonian crisis, and if so, how; and what other factors besides infection could do this. He also asked the indication for giving cortisone, and the main guiding factors in keeping cortisone going.

Dr. W. B. Macdonald replied that he had not seen emotional episodes precipitate Addisonian crises. Anorexia or failure of fluid intake could precipitate a crisis, or a patient could drift into that state with inadequate salt intake, and an infection could tip the balance. The indication for the use of cortisone was the clinical syndrome in association with an increased ketosteroid excretion. Treatment required a period of close observation for stabilization, but after that a country patient need be examined only about every six months.

DR. L. P. WAIT commented on two cases of adrenal tumour which he had encountered. In the first case the patient had had a large calcified tumour, with a moderately raised urinary 17-ketosteroid level. Operation was successfully performed, and the child was now a normal female of fifteen years. The second case was that of a child who had developed virilism at eight years of age and the urinary 17-ketosteroid output was 136 milligrammes for twenty-four hours. A large adrenal tumour was removed, and the child had reverted to being a female, the ketosteroid output now being four milligrammes in twenty-four hours.

DR. B. HUDSON agreed that cortisone had a very great effect in improving these children. However, they were presumably destined to take high doses of cortisone for long periods of life. With experience of adults in mind he could not help feeling rather worried about the continuation of cortisone therapy, and thought that the antimesenchymal effects of the drug might become manifest. As the operation of bilateral adrenalectomy was now becoming much simpler and the pre-operative and post-operative management much easier, he thought that logical treatment might be adrenalectomy. Administering cortisone was really performing medical adrenalectomy. Dr. Hudson asked whether the effect of cortisone was the same in *macrosomia genitoprœcox*. He

also suggested that a more convenient method of giving DOCA therapy was with injectable desoxytrimethyl acetate.

Dr. W. B. Macdonald, in reply, said that the only detrimental result of cortisone therapy observed so far was the stunting of growth in the early stage, but that had not persisted. Adrenalectomy had not in the past given good results, but it might be tried now. The effect of cortisone in cases of male virilism had not been reported.

Dr. H. N. B. Wettenhall asked in what proportion of "boys" presenting with hypospadias should the diagnosis of adreno-genital syndrome be considered.

Dr. Murray Clarke said that in a series of six cases of adreno-genital syndrome only two had been thought to be cases of hypospadias, and the true diagnosis was detected at three years of age when the patients grew pubic hair. However, very few patients with hypospadias showed this condition.

Dr. J. H. Colebatch asked for details of the maintenance dose of cortisone.

Dr. W. B. Macdonald said that he had used 50 milligrammes per day for the older ones and up to 18·5 milligrammes for toddlers; but the fact that he could not get the ketosteroid level down in the older ones had caused him to think that the cortisone could be reduced to twenty-five milligrammes per day.

Dr. Elizabeth K. Turner inquired whether, as the defect occurred between the twelfth and twentieth weeks of intra-uterine life, any noxious ante-natal influences had been observed at that stage. She also asked whether there was a familial incidence.

Dr. W. B. Macdonald said that there was a familial incidence. Males were more susceptible to Addisonian states, and died more often than females. He did not know of any noxious ante-natal influences.

Out of the Past.

In this column will be published from time to time extracts, taken from medical journals, newspapers, official and historical records, diaries and so on, dealing with events connected with the early medical history of Australia.

CASE OF IMPACTED HERNIA.[1]

[From the *Australian Medical Journal*, August 1, 1846.]

I was requested by a medical gentleman to see a groom of Mr. Nosh's who had a tumour in the right groin, about the size of an egg. He had been drinking hard the previous day and while skylarking suddenly felt a pain in the groin: and on putting his hand to the seat of the pain discovered a small tumour. He remained some hours in great pain and then sent for his medical attendant who bled him and tried the usual remedies but failed to reduce it. Being requested to see the sufferer whose case was said to be strangulated hernia, requiring the knife, I found him in bed suffering great pain when the tumour was handled. It looked very like an enlarged gland, but on coughing it was impelled downwards. He also had a considerable degree of abdominal tenderness; vomiting and constipated bowels; pulse small and quick; in fact any gentleman, unguarded, would have at once pronounced the tumour a strangulated hernia. Having asked the question whether he had drunk hard the previous day and being answered in the affirmative, I naturally concluded that these symptoms were produced by the effects of the drink and constipation. The surgeon who saw him first, having tried the necessary remedies and failed just before I called, and it being then the time for performing my outdoor Government duties, I requested that he might be sent to hospital. On my return I examined the tumour and on pressing it gently it returned into the cavity of the abdomen with a loud gurgling noise heard by every person in the ward. A truss was immediately applied and he was discharged, to the astonishment of those who sent him into the hospital. I have recorded this case to show how one medical man may be foiled and another succeed in such cases.

Thomas Robertson,
Surgeon attached to Col. Hospital,
Parramatta.

[1] From the original in the Mitchell Library, Sydney.

Correspondence.

CONCERNING PROCTOLOGY.

Sir: Mr. Kenneth W. Starr's letter on this subject is so fantastic that it is obviously written with his tongue in his cheek. For surely no one would express seriously such views as could be taken so readily for lack of knowledge of the subject. However, in case there are some who read and fail to appreciate the facetious note, certain comments must be made.

The surgical principles that he lampoons have been evolved over more than half a century at special proctological hospitals in London—St. Mark's and the Gordon. They have been so evolved by skilful, thoughtful and brilliant surgeons who have been constantly confronted with proctological problems. Moreover, I know, having worked at the Gordon Hospital, and often visited St. Mark's Hospital, that they have modern operating theatres, sterilizers, caps, masks and gowns.

It is unfortunate that Mr. Starr's results from treatment by orthodox methods have been so poor (leakage of mucus, post-anal cesspools *et cetera*). The articles of which he complains will supply the remedy.

Next, Mr. Starr indulges in some self praise, the keynote being that he is both modern and enterprising. His modernity consists of: (i) sewing wounds, which we did at the Coast Hospital in 1926, and it was given up long before Mr. Starr started his crusade twelve years ago; and (ii) Whitehead's method. It is difficult to say when this was given up, but in Rowlands and Turner's text-book of operative surgery (1937) there appears: "When successful, it is a good operation. On the other hand, the results of an unsuccessful operation are appalling."

As for enterprise—well, the Greeks might have had another word for it; and Mr. Starr himself says he is rash.

The worst ischio-rectal abscess I ever saw followed sewing up a fistula (not by me or Mr. Starr), and another patient who had had several modern operations for fistula, recalled the old limerick:

There was a young woman of Cherstun
Whose third husband was by far the worst 'un,
For he was reckoned
Far worse than the second
And the second was worse'n the first 'un.

Yours, etc.,
149 Macquarie Street, C. H. Wickham Lawes.
Sydney,
September 15, 1954.

AN APPEAL.

Sir: Wanted by R.S.L. Sub-Branch, 4c, N.S.W., a wheel chair for totally disabled war veteran. Please send details of any offer to the address below.

Yours, etc.,
T. C. Lawrence,
Urbenville, President, R.S.L. Sub-Branch.
New South Wales,
Undated.

THE ENIGMA OF THE MONA LISA SMILE.

Sir: I wish to thank Dr. Arthur D'Ombrain for his appreciation of the thesis I propounded regarding Da Vinci's Mona Lisa, and also for applying his own knowledge and imagination to the subject. His suggestion that Da Vinci's early experience, during his formative years, of being detached from an at-first devoted and later deserted mother, may have, by auto-suggestion, been reflected in the dualistic portrayal of the Mona Lisa expression, appears feasible. In this, however, exogenous influences in environment would, nevertheless, operate through the endogenous medium of the undeniable bipolarism of excitory and inhibitory type, which is just as characteristic in the synthesis of the macrocell of the total living organism as it is all pooling single visceral and nervous cells.

The stark final sentence in Dr. D'Ombrain's letter, that the expression of the Mona Lisa epitomizes an outlook, which sums up men in terms of "What they can get, that's what they want", states a part truth, which needs divesting of

some of its cynicism. I do not need to point out to Dr. D'Ombrain that man's innate capacity for altruism, as such inspires a Lister, a Schrieger, a Plimsoll, a Wilberforce, a Florence Nightingale, or those who, in every walk of life, risk life and health for lost hikers in the snow, also needs accentuation. The main purport of the thesis pursued herein is that love and hate, as intensifications of simpler attractions towards Nature's bounties and repulsions towards her pitfalls, respectively, are not reared on independent physiological mechanisms, but are physiologically reversing constructive ends of a unified and rapidly switching mobile equilibrium.

Professor Baylis in his "Treatise on Physiology" has stated that excitation and inhibition are not reared on a serial basis of cause and effect, but "oscillate into one another". We see this with a viscero-psychic application in the following situation. At the beginning of a meal during excitory vagal function and enzyme secretion, the secreting cells carry a negative charge on the surface and a positive charge at the parenteral pole of the cell. On satiation, the inhibitory sympathetic branch of the autonomic system takes over, with a reversal of electro-magnetic orientation, the positive charge now being on the surface. In this repressive phase, a glairy mucus is secreted to protect the stomach from autodigestion. So, at a convivial dinner a brandy liqueur is a good old-fashioned custom, during the sympathetic phase, to save man's social face and loquacity from a minor somatic-psychic inhibition. Alcohol in reality surmounts inhibitory impulses by being a relative, or fractional, non-conductor implanted on neuro-electronic impulses, and so leaves visceral appetital function to its devices, and vices, in excess.

Returning to the main theme, Professor A. R. Chisholm (French) at the Melbourne University wrote that the article on the Mona Lisa (as somewhat sensationally epitomized in the Press) interested him, because when he was a student in Paris, twenty-five years ago, Abrahams had sectioned the photographs of many celebrities familiar to the professor. This device revealed that, on composing two double faces from each half-face, there emerged what Abrahams termed a "working" and a "social" face. The professor summed this up "as an æsthetic proof of the physiological differentiation, revealed by 'vertical bisection' of the face, of the Mona Lisa".

Finally, while recalling the effect of auto-suggestion in the case of Da Vinci's reaction, it is of interest to note that when Sir Joseph Banks, with his latent talents, fortuitously saw an English lane lined by daffodils, at the age of fourteen, he bought his first book on botany. So he became later the moving spirit in financing the Australia-discovering voyage of Captain Cook when the latter set out to study the transit of Venus from the Pacific and to collect botanical specimens. When Sir Joseph became crippled with arthritis, he inspired his kinsmen and friends, Franklin, Flinders and Bass, to enlarge his endeavours to our advantage.

Yours, etc.,

111 Collins Street,
Melbourne,
September 20, 1954.

FRANK TRINCA.

Research.

THE NEW SOUTH WALES STATE CANCER COUNCIL.

THE New South Wales State Cancer Council has forwarded the following information relating to research fellowships, travelling fellowships and grants in aid for research into cancer. Allotments will be made from a fund established for the support of fundamental and clinical research into cancer. The details are as follows.

Research Fellowships.

Research fellowships are available to medical or science graduates, or to persons with equivalent scientific training. Fellows are expected to devote the whole of their time to their approved research project. Fellowships will be granted for a term of one, two or three years, in the first instance. The work of a Fellow must be carried out in an approved institution or department, under the supervision of an

DISEASES NOTIFIED IN EACH STATE AND TERRITORY OF AUSTRALIA FOR THE WEEK ENDED SEPTEMBER 11, 1954.[1]

Disease.	New South Wales.	Victoria.	Queensland.	South Australia.	Western Australia.	Tasmania.	Northern Territory.[2]	Australian Capital Territory.	Australia.[2]
Acute Rheumatism	..	2(2)	1	..	1	..	..	..	4
Amœbiasis	..	..	..	..	..	..	..	..	..
Ancylostomiasis	..	..	..	..	..	..	..	..	..
Anthrax	..	..	..	..	..	..	..	..	..
Bilharziasis	..	..	..	..	..	..	..	..	..
Brucellosis	1	..	..	..	1	..	..	..	2
Cholera	..	..	..	..	..	..	..	..	..
Chorea (St. Vitus)	..	..	..	..	..	..	..	..	..
Dengue	..	..	..	..	..	..	..	..	..
Diarrhœa (Infantile)	22(12)	9(8)	..	..	..	..	..	..	31
Diphtheria	3(3)	1(1)	2(1)	..	1(1)	..	..	..	7
Dysentery (Bacillary)	1	2(2)	3(3)	..	2(2)	..	..	..	8
Encephalitis	..	..	..	1(1)	..	..	..	1	2
Filariasis	..	..	..	..	..	..	..	..	..
Homologous Serum Jaundice	..	..	..	..	..	..	..	..	..
Hydatid	..	..	..	..	..	2(1)	..	..	2
Infective Hepatitis	29(12)	25(17)	..	..	4(3)	..	..	2	60
Lead Poisoning	..	..	1(1)	..	..	..	..	..	1
Leprosy	..	..	..	..	1	..	..	..	1
Leptospirosis	..	..	3	..	..	..	..	..	3
Malaria	..	2(1)	1(1)	..	4(4)	..	..	..	7
Meningococcal Infection	9(2)	5	3	..	..	..	..	..	17
Ophthalmia	..	..	..	..	..	..	..	..	..
Ornithosis	..	..	..	..	..	..	..	..	..
Paratyphoid	..	..	..	..	..	..	..	..	..
Plague	..	..	..	..	..	..	..	..	..
Poliomyelitis	8(4)	11(10)	1	4(4)	..	1	..	..	25
Puerperal Fever	..	1(1)	..	..	..	..	..	..	1
Rubella	..	12(8)	..	..	7(7)	..	..	..	19
Salmonella Infection	..	..	..	..	..	..	..	..	..
Scarlet Fever	18(12)	26(16)	8(7)	8(6)	..	..	..	..	60
Smallpox	..	..	..	..	..	..	..	..	..
Tetanus	..	..	1(1)	..	..	..	..	..	1
Trachoma	..	..	..	..	1	..	..	..	1
Trichinosis	..	..	..	..	..	..	..	..	..
Tuberculosis	36(29)	22(15)	11(7)	4(2)	10(3)	3	..	..	86
Typhoid Fever	..	..	..	1(1)	..	..	..	..	1
Typhus (Flea-, Mite- and Tick-borne)	..	..	2	..	..	..	..	..	2
Typhus (Louse-borne)	..	..	..	..	..	..	..	..	..
Yellow Fever	..	..	..	..	..	..	..	..	..

[1] Figures in parentheses are those for the metropolitan area.

[2] Figures not available.

[3] Figures incomplete owing to absence of returns from Northern Territory.

approved worker. Before making application for a fellowship, it will be necessary for candidates to have made satisfactory arrangements in that regard, and for the head of the institution or department to have agreed to sponsor the project. The salary of a Fellow will be at the rate of from £1250 to £1500 *per annum*, with an increase of £150 *per annum* if the fellowship is renewed. Higher remuneration may be paid to senior research workers.

Travelling Fellowships.

Travelling fellowships may be granted for a period of two years abroad, followed by a third year in an approved institution in New South Wales. The remuneration ranges from £1500 to £2000 *per annum*, with approved travelling expenses.

Grants in Aid.

Grants in aid are available to institutions or departments with basic facilities and qualified personnel for cancer research, to support specific research schemes under the direction of particular workers. Grants will be made annually to cover all the financial requirements of approved research programmes, except the salary of the head of the sponsoring institution or department concerned and the use of facilities already available for the purpose. In the first instance, grants will be made for periods of one, two or three years. Applications for grants in aid should be prepared by the workers in charge of the projected programme, and submitted by the head of the institution or department.

General Information.

Fellowships and grants in aid should be taken up within six months of notification of allotment.

The closing date of applications, which should be forwarded to the Secretary, New South Wales State Cancer Council, Box 3944, G.P.O., Sydney, is November 17, 1954. Application forms may be obtained by writing to the above-mentioned address, or on personal application to the Inquiry Office, Fourth Floor, 52 Bridge Street, Sydney, or Inquiry Office, School of Public Health and Tropical Medicine, University of Sydney.

Notice.

THORACIC SOCIETY OF QUEENSLAND.

THE Thoracic Society of Queensland will present a clinical session of thoracic disorders for discussion by Dr. J. G. Scadding on the Ground Floor, Medical School, University of Queensland, at 4 p.m. on Wednesday, October 27. Members desiring to present cases should notify the Secretary, Dr. A. H. Robertson, at the Brisbane Clinic.

SECTION OF INDUSTRIAL MEDICINE, VICTORIAN BRANCH, BRITISH MEDICAL ASSOCIATION.

THE next meeting of the Section of Industrial Medicine of the Victorian Branch of the British Medical Association will be held in the Medical Society Hall, 426 Albert Street, East Melbourne, at 8.30 p.m. on Tuesday, October 12, 1954. Dr. A. R. Wakefield will deliver a paper entitled "The Management of Common Hand Injuries". All members of the Association are invited.

Nominations and Elections.

THE undermentioned has applied for election as a member of the New South Wales Branch of the British Medical Association:

Fisher, Robin Gerard Wyndham, M.B., B.S., 1953 (Univ. Sydney), Cambridge City Hospital, Cambridge, Massachusetts, United States of America.

The undermentioned have been elected as members of the New South Wales Branch of the British Medical Association: Asten-Reed, Raymond William, M.B., B.S., 1954 (Univ. Sydney); Collins, Geoffrey Morison, M.B., B.S., 1954 (Univ. Sydney); Connors, Kevin Patrick, M.B., B.S., 1954 (Univ. Sydney); Cumming, William James, M.B., B.S., 1954 (Univ. Sydney); Davies, William Edward Lewis, M.B., B.S., 1954 (Univ. Sydney); Jordan, Geoffrey Ellis, M.B., B.S., 1954 (Univ. Sydney); Silverton, Robert Peter, M.B., B.S., 1954 (Univ. Sydney); Hoyle, Alan Ross, M.B., B.S., 1953 (Univ. Sydney); Hume, Kenneth Francis, M.B., B.S., 1953 (Univ. Sydney).

Deaths.

THE following deaths have been announced:

SCHOLES.—Frank Victor Scholes, on September 11, 1954, at Toorak, Victoria.

ASHKENASY.—Mark Ashkenasy, on September 13, 1954, at Carlton, Victoria.

STOCKS.—Alfred William John Stocks, on September 13, 1954, at Montreal, Canada.

Diary for the Month.

OCT. 5.—New South Wales Branch, B.M.A.: Council Quarterly.
OCT. 6.—Victorian Branch, B.M.A.: Branch Meeting.
OCT. 6.—Western Australian Branch, B.M.A.: Council Meeting.
OCT. 8.—Queensland Branch, B.M.A.: Council Meeting.
OCT. 12.—New South Wales Branch, B.M.A.: Organization and Science Committee.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, *W.C.1.*

New South Wales Branch (Medical Secretary, 135 Macquarie Street, Sydney): All contract practice appointments in New South Wales.

Queensland Branch (Honorary Secretary, B.M.A. House, 225 Wickham Terrace, Brisbane, B17): Brisbane Associated Friendly Societies' Medical Institute; Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 80 Brougham Place, North Adelaide): All Contract Practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 205 Saint George's Terrace, Perth): Norseman Hospital; all Contract Practice appointments in Western Australia. All government appointments with the exception of those of the Department of Public Health.

Tasmania: Part-time specialist appointments for the north-west coast of Tasmania.

Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

All communications should be addressed to the Editor, THE MEDICAL JOURNAL OF AUSTRALIA, The Printing House, Seamer Street, Glebe, New South Wales. (Telephones: MW 2651-2-3.)

Members and subscribers are requested to notify the Manager, THE MEDICAL JOURNAL OF AUSTRALIA, Seamer Street, Glebe, New South Wales, without delay, of any irregularity in the delivery of this journal. The management cannot accept any responsibility or recognize any claim arising out of non-receipt of journals unless such notification is received within one month.

SUBSCRIPTION RATES.—Medical students and others not receiving THE MEDICAL JOURNAL OF AUSTRALIA in virtue of membership of the Branches of the British Medical Association in the Commonwealth can become subscribers to the journal by applying to the Manager or through the usual agents and booksellers. Subscriptions can commence at the beginning of any quarter and are renewable on December 31. The rate is £5 *per annum* within Australia and the British Commonwealth of Nations, and £6 10s. *per annum* within America and foreign countries, payable in advance.